ANNUAL WORKFORCE REPORT 2009

Tennessee Department of
Labor and Workforce Development
Employment Security Division
Labor Market Information Section
Occupational Data Unit
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Investment in Growth of Tennessee's Workforce and Local Workforce Investment Areas for the Short- and Long-term, 2009 through 2016

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Summary

This annual report by the Department of Labor and Workforce Development analyzes employment in years 2009 through 2016 in Tennessee and its Local Workforce Investment Areas. Duration of unemployment is longer than ever in the last quarter century, while unemployment claims have been increasing monthly by double-digit percentages. Some recent data show some improvement among otherwise mixed employment indicators. Consumer confidence is improving, along with favorable interest rates. Checking and savings deposits are growing, but general consumption and housing and vehicle sales remain tepid. Nationally the rate of increase in wages and benefits of workers has slowed from 2006. Revival of industry depends on workers balancing necessary expenditures while increasing savings. Improvement in employment usually contributes to increasing consumption of goods, but an increase in employment is also the result of increased consumption.

Goods-producing industries are projected to decline sharply at 3.3 percent during 2009-2010. Service-providing industries are likely to decrease by a modest 0.4 percent. Continued growth is likely in health care, other services, and educational services—all of which serve a growing and aging population. Employment in wholesale trade shows growth, but retail trade is projected to decline significantly. The administration and support and waste management and remediation, real estate, manufacturing, transportation, and information industries are projected to fall significantly.

This research gives ample evidence that higher levels of skill and knowledge are necessary to reduce current and projected occupational shortages. Technological innovations such as computers, satellites, biotechnology, and lasers have improved productivity in industries, including the education and health industries that continue to grow. The subsiding of energy costs since summer of 2008 may slow the resurgence of green industries that have great potential benefits once the price of oil again increases.

More jobs are likely to become available in industries providing services than in the industries producing goods. Emerging and in-demand occupations requiring these abilities, including the green occupations, are identified. Successful training programs have content adequate to train employees with needed skills and knowledge and to attract new talent. Supply and demand for occupations are described through cluster analysis. The growth of the education and health care industries is related to the increased need for workers with specialized higher degrees including AA, MA, PhD, and first Professional degrees.

The report is divided into several parts, including historical employment from 1990 to 2009, projected industry employment for 2006 to 2016, contemporary structural change, wages, green industries, and cluster analyses of employment.

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Executive Summary

The following report shows employment dynamics in the Local Workforce Investment Areas of Tennessee from 1990 through the present and includes projections through 2016. Projected occupational shortages are identified. Challenges that Tennessee currently faces in education, income, and in relation to supply and demand are identified. This report describes the areas of Tennessee in some detail, and presents information on growing and declining occupations and industries. Some economic indicators are now more promising, so any stimulus can provide the energy needed to more quickly improve the economy and create new jobs.

Employment to 2009 (page 10)

- Goods-producing industries have declined at a rapid rate.
- Service-providing industries have grown slightly.
- Employment declined sharply from January 2008 to March 2009.
- Unemployment is now above 10 percent, and about one percent higher than the national average.
- The unemployed are experiencing the highest duration of unemployment since 1983.
- Unemployment initial claims stabilized from the previous quarter through the second quarter of 2009, after a significant downturn since summer 2008.
- Economic indicators are mixed, with no sure signs that the downturn is easing.

Short and Long-term Projections (page 26)

- Trade, transportation, and utilities is the largest industry sector in Tennessee, and education and health services the second largest sector.
- Long-term growth is expected to be about 1.2 percent per year for years 2006-2016, but growth is expected to decline in 2008-2010, with an average 0.9 percent per year decline projected.
- The information and manufacturing industries are expected to decline significantly in 2009 and 2010.
- Education and health are to show healthy growth in both the short- and long-term.

Education, Income, and Poverty (page 35)

- Poverty is increasing in the US and Tennessee.
- Poverty is higher in Tennessee with 13.5 percent classified as poor.
- Unemployment in Tennessee was 10.3 percent in May 2009.
- Unemployment in Tennessee Local Workforce Investment Areas (LWIAs) ranged from 7.9 percent (LWIA 3, Knox County) to 13.5 percent (LWIA 10, Duck River area) in May 2009.
- Unemployment differs significantly within LWIAs from county to county, even in LWIAs with low unemployment.
- LWIAs with high percentages of Bachelor's degrees are relatively buffered from unemployment.

- LWIAs with higher percentages of adults with high school diplomas generally have less poverty.

Industries and Occupations in Local Workforce Investment Areas (page 47)

- LWIAs vary by industry distribution. Some LWIAs have significantly more employees in education and health services, or in manufacturing.
- LWIAs that have high percentages in manufacturing have higher unemployment since that industry sector is declining now.
- Urban LWIAs generally have higher educational attainment and lower unemployment.
- Occupations vary across LWIAs.

Wages in Tennessee since 2002 (page 55)

- Wage gains vary by occupation; with management, arts and entertainment, and recreation gaining in wages.
- Industries with higher wages increased their advantage, generally.
- Wages reflect, in part, differences in educational levels of workers.
- Decreased wages may result from weakened economic growth in the host industry.

Emerging Industries and Economic and Workforce Development (page 61)

- Tennessee has achieved remarkable success in landing a wide array of emerging technology projects related to energy independence, including Hemlock Semiconductor; Wacker Chemie AG; the planned Volunteer State Solar Initiative; the Volkwagen high fuel efficiency diesel car plant; the Nissan lithium ion battery production facility and electric car production; and eTec, providing electric charging stations. These investments represent billions of dollars of investment in renewable energy and energy efficient transportation and tens of thousands of potential jobs.
- With the new Clean Energy law, the state will lead in energy management.

Long Term (to 2016) Supply and Demand in Tennessee (page 71)

- Occupations with very high supply-demand ratio include communications, arts and crafts, optometry, dentistry, and educational administration. These areas are very competitive.
- Occupational areas with moderate supply-demand ratio (competitive) include general business and management, surgical technology, social sciences, foreign language postsecondary teaching, biology, and general engineering.
- Occupational areas with shortages (more demand than supply) include health, teaching, and construction. Registered and licensed practical nurses and dental and pharmacy workers are in demand. Shortage occupations include pharmacy assistants and technicians, dental assistants, and teachers in preschool and elementary programs. Special education teachers are needed in preschool, kindergarten, and elementary schools. Construction worker shortages include painters, ironworkers, pipe fitters, insulation workers, and maintenance and repair workers. Workers are needed in heating, air, and refrigeration.

Investment in Growth of Tennessee's Workforce and Local Workforce Investment Areas for the Short- and Long-term, 2009 through 2016

Employment data in Tennessee and the nation reflect a significantly deteriorating economy from the last half of 2008 through the first two quarters of 2009. Some indicators in more recent months are less disheartening, prompting hopes that the further weakening may be nearing its end. Several months of improving statistics will be necessary to see the economy rebound, if the trend is to reverse this year. Unemployment must reach its bottom, or nadir, before improvement begins. With unemployment in Tennessee falling toward 11 percent, and the national average moving toward 10 percent, the nadir does not appear to have been reached.

Current employment trends show an increase in unemployment at both the national and state levels. Workforce recovery may be slow, with projections for the short-term in Tennessee for the years 2009 and 2010 showing an average annual rate of decline of 0.8 percent. Long-term projections for 2006-2016 show an expected 1.2 percent per year employment growth. Analyses of the employment data for the recent past and projections for the next few years are an aid to knowing, understanding, and extrapolating employment.

Analysis of change in historical employment from 2007 through early 2009 helps determine the critical indicators necessary for recovery. Changes in indicators related to employment are helpful to anticipate employment changes. Indicators include those that anticipate employment change (leading indicators), those that change in concert with employment (coincident), and those that follow (lagging). Some of these indicators are combined into indexes, such as the Index of Leading Indicators. Other indicators of interest are measures of retail sales, food services and real durables consumption, which have shown some improvement. Little improvement has occurred in vehicle sales, real nonresidential fixed investments, and housing and new home sales. Consumer sentiment is stable or improving.

Sharp declines in many recent employment indicators suggest the projections for 2006-2016 may have been optimistic, since they were based, to some extent, on indicators before the third and fourth quarter had fully ended. A recovery during 2009 and 2010 would indicate long-term projections for 2006-2016 are realistic. Projections for 2006-2016 are discussed in an earlier paper (Tennessee State Government, August 2008)

(http://www.state.tn.us/labor-wfd/tnworkforce2008.pdf). This paper extends the 2006-2016 analyses to the 13 LWIAs of Tennessee.

- A central feature of this paper is the **short-term projections of Tennessee industries and occupations for years 2009-2010**.

It is not surprising that changes in employment and wages vary by Local Workforce Investment Areas (LWIAs), with their varied social, economic, demographic, and ecological dimensions, including rural-urban. Extensive discussion of LWIAs for the years 2004-2014 by industry, occupations, employment, and education are contained in the 2007 annual report (Tennessee State Government, Labor and Workforce Development, August 2007).

- Current employment from the **Local Workforce Investment Areas (LWIAs)** and projections to 2016 show the workforce as it varies by industry, occupation, education, and wage levels across the geographic regions of the state.

With the 21st century proceeding, workers in emerging industries compete for global advantage, as they train for occupations in industries with available jobs. Analyses of occupations reveal skills and knowledge needed now for increased productivity and innovation, as were discussed in our previous report (Tennessee State Government, 2008). The decline of goods-producing industries with the increase of knowledge-demanding jobs in education and health accentuate the need for advanced skills and education in today's job market.

- The interrelation of **skills and knowledge** to the changed job market is a key to job retraining and emerging needs.

Occupations needed to supply job openings are classified by cluster.

- Classifying **occupations by supply and demand clusters** as they relate to education helps to clarify the match between worker resources and industry needs.

I. Recent Employment Changes in Tennessee with Historic Perspective

Employment Changes in 2008 and 2009

Declines and increases are measured in various ways, by change in average monthly employment from one year to the next, changes from December to December, or changes within a month. Differences using yearly averages are likely to show less abrupt changes, while changes from an arbitrarily chosen beginning month to an ending month can magnify the degree of change. Methods of measurements sometimes yield strikingly

different results, but analysis of employment change over the last year shows striking declines, regardless of the date interval chosen.

Slowing Growth in 2007. Tennessee had a growth rate (yearly average) of 0.5 percent during 2007, with 14,700 jobs added (Table 1, page 12). Year 2007 had the lowest growth rate since 2003 when the state's employment declined by 1,700. About 30,700 jobs were added in the service-providing industries (1.4 percent increase); 16,000 jobs were lost in the goods-producing industries. Manufacturing fell in 2007 by 4.9 percent while construction, natural resources, and mining grew at 2.6 percent. All service-producing sectors grew in 2007.

Industry Decline Reaches Service Industries in 2008. Tennessee employment declined an average of 0.8 percent in from 2007 to 2008. The greater declines were in durable goods manufacturing at 6.4 percent; natural resources, mining, and construction at 4.5 percent; and nondurable goods manufacturing at 3.0 percent. Trade, transportation, and utilities, along with professional and business services, leisure and hospitality, and other services, joined construction as industries that reversed from strong growth to decline during the year 2008. Manufacturing employment has declined every year since 1996, except for 1998, when it increased by 1/10 of one percent.

Service-providing industries experienced anemic growth in 2008 at 0.1 percent, far below their growth of 1.4 percent in the previous year. Goods-producing industries dipped from an anemic decline of 3.0 percent in 2007 to a 4.4 percent decline in 2008.

Table 1. Annual Average Employment Change in Major Industries in Tennessee, 2007 and 2008, Current Employment Statistics

Industry	2007 Job Change	Annual Percentage Change	2008 Job Change	Annual Percentage Change
Total Nonfarm	14.7	0.5%	-21.2	-0.8%
Goods Producing	-16.0	-3.0%	-22.6	-4.4%
Natural Resources, Mining & Construction	3.5	2.6%	-4.5	-3.3%
Manufacturing	-19.4	-4.9%	-18.2	-4.8%
Durable Goods	-14.7	-5.8%	-15.1	-6.4%
Non-Durable Goods	-4.8	-3.3%	-3.0	-2.1%
Service-Providing	30.7	1.4%	1.3	0.1%
Trade, Transportation, and Utilities	3.2	0.5%	-9.3	-1.5%
Information	0.7	1.4%	0.0	0.0%
Financial Activities	1.3	0.9%	0.2	0.1%
Professional and Business Services	3.6	1.1%	-1.0	-0.3%
Educational and Health Services	9.2	2.7%	7.8	2.2%
Leisure and Hospitality	6.2	2.3%	-0.8	-0.3%
Other Services	2.2	2.2%	-0.4	-0.4%
Government	4.4	1.1%	4.8	1.1%

Growth in Educational and Health Services.. Educational and health services grew at 2.2 percent from 2008 to 2009, reflecting growing numbers of students and patients.

Accelerated Decline in 2008 and Early 2009. Employment declined by 60,200 (2.1 percent) from December 2007 to December 2008, according to Current Employment Statistics. The period from November 2008 through April 2009 shows between 13,500 and 19,000 fewer jobs than the previous month (seasonally adjusted) (Figure 1, page 13).

Unemployment in 2008 and 2009

Tennessee Alignment with Nation in Unemployment in Latter 2008 Undone by Early 2009. Unemployment in Tennessee grew significantly compared to the nation in the first five months of 2008 (Figure 2, page 14). The latter part of 2008 showed the nation's unemployment rate approaching Tennessee's rate. By May 2009, the unadjusted unemployment rate difference had widened a percent difference, with Tennessee at 10.3 percent and the nation's at 9.1 percent.

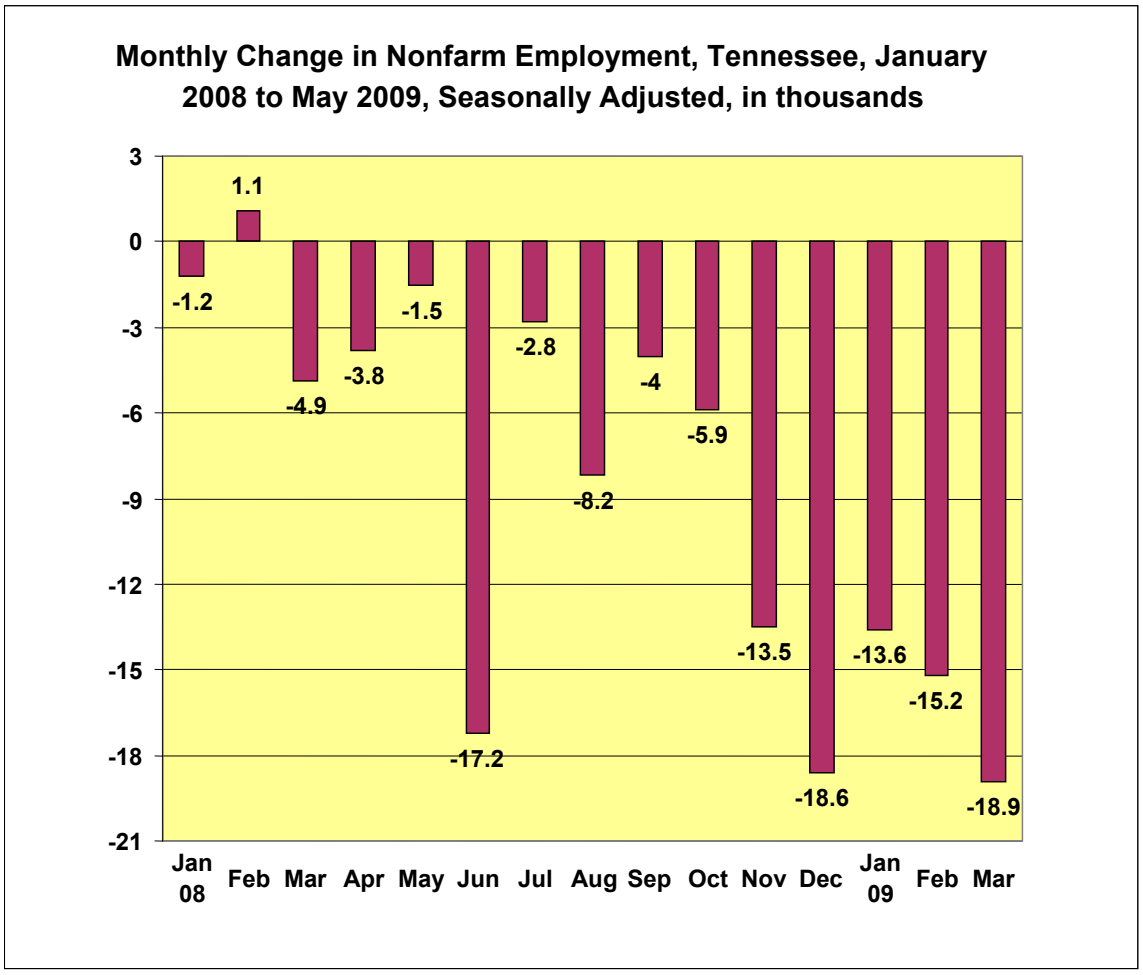
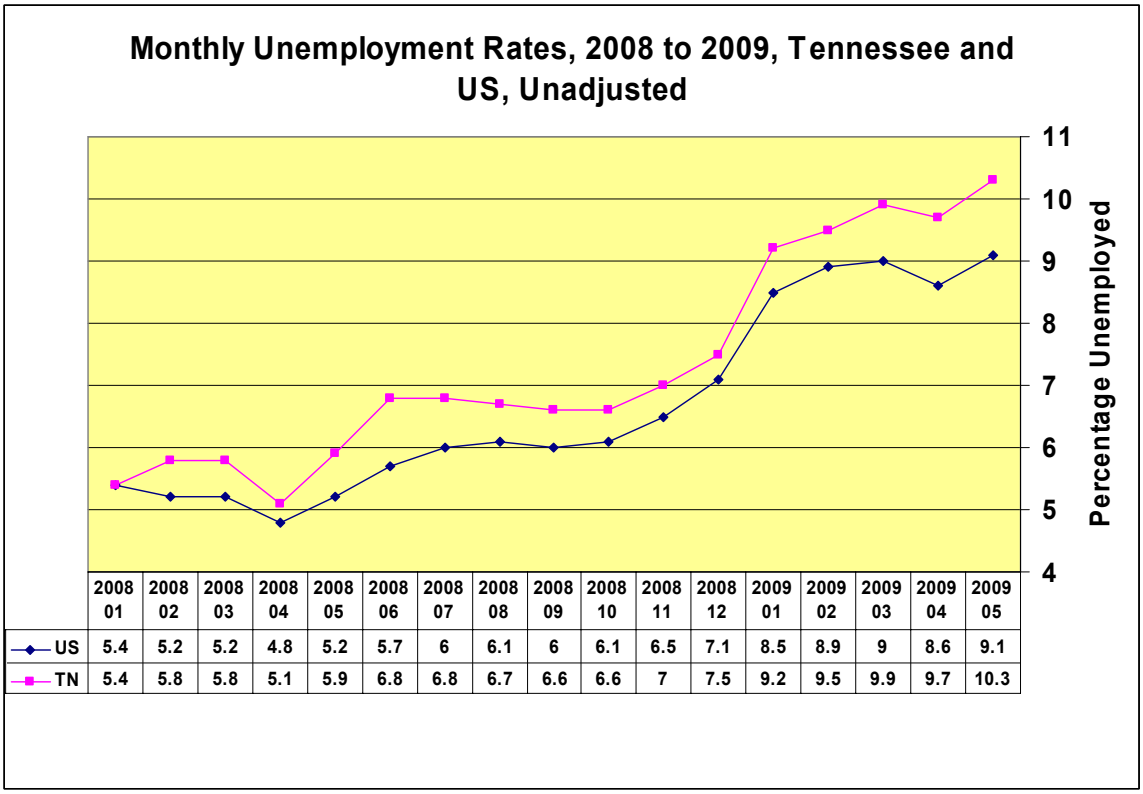


Figure 1. Monthly Nonfarm Employment Change in Tennessee in 2008 and 2009



	2008 01	2008 02	2008 03	2008 04	2008 05	2008 06	2008 07	2008 08	2008 09	2008 10	2008 11	2008 12	2009 01	2009 02	2009 03	2009 04	2009 05
US	5.4	5.2	5.2	4.8	5.2	5.7	6	6.1	6	6.1	6.5	7.1	8.5	8.9	9	8.6	9.1
TN	5.4	5.8	5.8	5.1	5.9	6.8	6.8	6.7	6.6	6.6	7	7.5	9.2	9.5	9.9	9.7	10.3

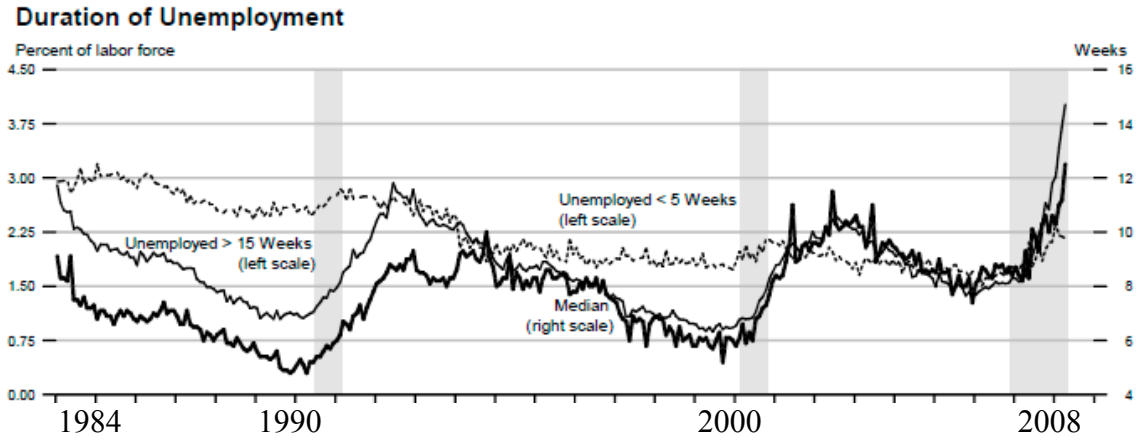
Figure 2. Monthly Unemployment Rates, 2008 to 2009, Tennessee and US, Not Adjusted

Information from Unemployment Insurance. Unemployment insurance claims reveal at least momentary improvement within industry sectors occurring in May 2009 (Table 2, page 12, through Table 5, page 17). Unemployment insurance is recorded, first, by *initial* claims, or the first time a claimant files for unemployment benefits. Second, *continued* claims are extension of initial claims, filed weekly as unemployment continues. Duration of unemployment exists when claims continue from month to month. Exhaustion occurs when the maximum of claims or claim amounts legislated are reached. Longer durations imply higher exhaustion rates.

Unemployment of Long Duration. Unemployment today is characterized by long duration—a higher percentage of workers are likely to be unemployed for longer periods. The median unemployment period is higher than in the recession of the early 1980s (Figure 3, page 15). Unemployment is relatively short for the median worker, but pernicious for over three percent of the labor force, who are experiencing the longest duration in the last quarter century.

Unemployment in the United States for greater than 15 weeks is above 3.75 percent, the highest percentage in the 1984 to 2009 period (Figure 3, page 15). The median duration of unemployment is above 12 weeks, the highest percentage in the 26 year period. Those

unemployed for less than 5 weeks is a lower percentage of the labor force, than in previous recessions.



Note: Shadowed areas are recession periods.

Source: National Economic Trends, Federal Reserve Bank of St. Louis, June 2009

Figure 3. Duration of Unemployment, US

There are many factors related to duration of unemployment, which is a good indicator of exhaustion of unemployment insurance. Benefits are said to be exhausted when the unemployed has used all the weeks of eligibility for his or her unemployment insurance. The ratio of weekly benefit amount to weekly wage is related to likelihood of unemployment insurance exhaustion (Robinson, 2003). The time span between filing and the loss of job is also related, together with the tenure of the unemployed in his or her last job. The availability of public transportation is important, particularly in situations where there is no private means of transportation available. Socio-economic status and educational levels are interrelated with the other factors, so there is a cluster of relevant factors correlated with exhaustion.

Momentary Drop in Growth of Unemployment Insurance Continued Claims. The percentage of average monthly change in continued unemployment insurance claims increased dramatically in some industry sectors from the first quarter of 2008 through the first quarter of 2009 (Table 2, page 16). Continued claims represent those of longer duration. Increases were felt in all industry sectors. Higher unemployment was felt in all sectors, except for financial activities, professional and business services, and education and health services where the effect was mitigated. The number of unemployed with insurance claims is shown in Table 3, page 16.

Table 2. Average Quarterly Change in Unemployment Insurance Continued Claims, 2008 and 2009, Tennessee

	Industry Sector											
Quarter	Natural Resources and Mining	Construction	Manufacturing	Trade, Transportation and Utilities	Information	Financial Activities	Professional and Business Services	Education and Health Services	Leisure and Hospitality	Other Service	Public Administration	All Industries
2008Q1*	-11.6%	-5.0%	-0.2%	1.4%	3.7%	0.8%	0.5%	1.8%	-8.9%	-1.2%	-12.5%	-1.7%
2008Q2	-26.0%	-14.5%	-3.0%	0.7%	5.0%	1.3%	4.0%	13.7%	-13.2%	13.4%	4.2%	-1.8%
2008Q3	17.0%	13.2%	34.5%	11.6%	20.6%	16.6%	11.5%	7.0%	8.9%	2.5%	10.2%	15.8%
2008Q4	51.0%	30.6%	25.1%	14.9%	9.5%	6.7%	13.4%	4.6%	22.0%	13.3%	15.0%	18.7%
2009Q1	8.9%	8.2%	12.2%	19.7%	17.7%	13.0%	12.8%	11.7%	18.3%	10.6%	7.5%	13.3%
2009Q2*	-4.8%	0.9%	1.1%	-3.7%	0.4%	-1.2%	2.2%	5.4%	-6.4%	3.6%	19.4%	0.2%

*First two months only

Unemployment Decrease Likely, or at More than 10 percent

Unemployment Increase Likely, or at More than 10 percent

Table 3. Number of Continued Claims for Unemployment Insurance by Quarter, 2008 and 2009, Tennessee

	Industry Sector											
Quarter	Natural Resources and Mining	Construction	Manufacturing	Trade, Transportation and Utilities	Information	Financial Activities	Professional and Business Services	Education and Health Services	Leisure and Hospitality	Other Service	Public Administration	All Industries
2008Q1	2,110	27,200	45,530	32,860	2,140	7,150	25,850	11,790	18,290	4,680	3,880	181,470
2008Q2	980	18,960	43,380	33,610	2,390	7,590	27,760	14,210	10,330	5,320	3,120	167,640
2008Q3	1,170	22,910	81,030	47,470	4,220	11,380	41,150	22,610	13,220	7,590	5,140	257,890
2008Q4	2,360	34,680	106,910	56,260	4,890	12,320	44,920	20,380	16,590	7,240	5,100	311,660
2009Q1	4,710	61,620	181,010	105,420	8,050	18,700	74,670	29,510	33,030	12,060	7,890	536,650
2009Q2*	2,560	40,340	118,730	68,710	6,030	13,150	52,410	21,660	18,750	8,260	6,950	357,530

Table 4. Average Quarterly Change in Unemployment Insurance Initial Claims, 2008 and 2009, Tennessee

	Industry Sector											
Quarter	Natural Resources and Mining	Construction	Manufacturing	Trade, Transportation and Utilities	Information	Financial Activities	Professional and Business Services	Education and Health Services	Leisure and Hospitality	Other Service	Public Administration	All Industries
2008Q1*	-48.3%	-34.4%	-3.5%	-17.2%	-8.1%	-7.6%	-15.0%	-3.5%	-44.9%	-25.7%	-41.2%	-19.3%
2008Q2	5.1%	-4.8%	0.7%	7.1%	24.9%	1.1%	10.7%	30.8%	7.7%	30.2%	45.4%	7.6%
2008Q3	1.5%	6.4%	36.9%	0.9%	-6.9%	3.4%	-5.8%	-17.0%	4.9%	-15.2%	-9.8%	2.6%
2008Q4	174.7%	64.7%	48.6%	31.9%	35.7%	12.1%	37.8%	8.1%	40.1%	34.5%	38.7%	39.9%
2009Q1	-38.0%	-20.5%	-11.1%	3.2%	15.7%	6.5%	-6.0%	5.5%	4.2%	-4.7%	-18.7%	-6.8%
2009Q2*	-3.1%	-5.3%	3.8%	-13.5%	-32.5%	-14.5%	-5.0%	28.0%	-2.5%	8.6%	58.7%	-2.9%

*First two months only

Unemployment Decrease Likely, or at More than 10 percent

Unemployment Increase Likely, or at More than 10 percent Unemployment Increases

Table 5. Number of Initial Claims for Unemployment Insurance, by Quarter, 2008 and 2009, Tennessee

	Industry Sector											
Quarter	Natural Resources and Mining	Construction	Manufacturing	Trade, Transportation and Utilities	Information	Financial Activities	Professional and Business Services	Education and Health Services	Leisure and Hospitality	Other Service	Public Administration	All Industries
2008Q1	420	6,820	11,490	9,640	610	2,050	7,410	3,670	5,350	1,210	840	49,490
2008Q2	160	4,090	10,630	10,340	760	2,050	8,310	5,780	3,150	1,610	1,050	47,910
2008Q3	170	4,520	20,560	9,890	800	2,090	8,270	5,070	3,300	1,280	910	56,860
2008Q4	970	10,730	30,620	15,910	1,220	2,680	12,310	4,690	5,800	1,830	1,240	87,990
2009Q1	770	11,240	30,670	22,840	1,800	3,370	14,430	5,940	8,530	2,190	1,220	102,980
2009Q2*	200	5,050	14,280	9,880	810	1,950	8,460	4,920	3,680	1,440	1,120	51,790

The strong increases largely disappeared by second quarter 2009 with declines in natural resources and mining, trade and transportation, financial activities, and leisure and hospitality. Other sectors showed modest increases from the previous months, but the improvement is relative to the strong increase in the previous months.

- **Strong declines in insurance claims in the coming months are necessary to reverse the strong growth in unemployment that occurred in latter 2008 and first quarter 2009**.

Unemployment in Historical Perspective

Employment in Tennessee increased an average of 1.1 percent per year from 1997 to 2007, with nonagricultural employment rising from 2,584,000 to 2,796,600. The rate of employment growth in Tennessee surpassed the nation in the early 1990s; during the late 1990s it lagged the nation; from 2005 to the present, it has lagged the nation (Figure 4, page 19). Tennessee employment has grown less than the national rate since 2002.

- Tennessee's unemployment rate has exceeded the national rate since 2005.

The rate of employment decline in the nation by most measures has dropped to lows not seen since the 1950s (Table 4, page 17; Figure 5, page 20). Some recent economic data suggest some hope of improvement.

The sharp increases in unemployment and decline in the labor force are correlated with various economic, monetary, social, and psychological indicators. Some changes in economic and social variables suggest that a change in employment for the better may be imminent, as discussed in the next section.

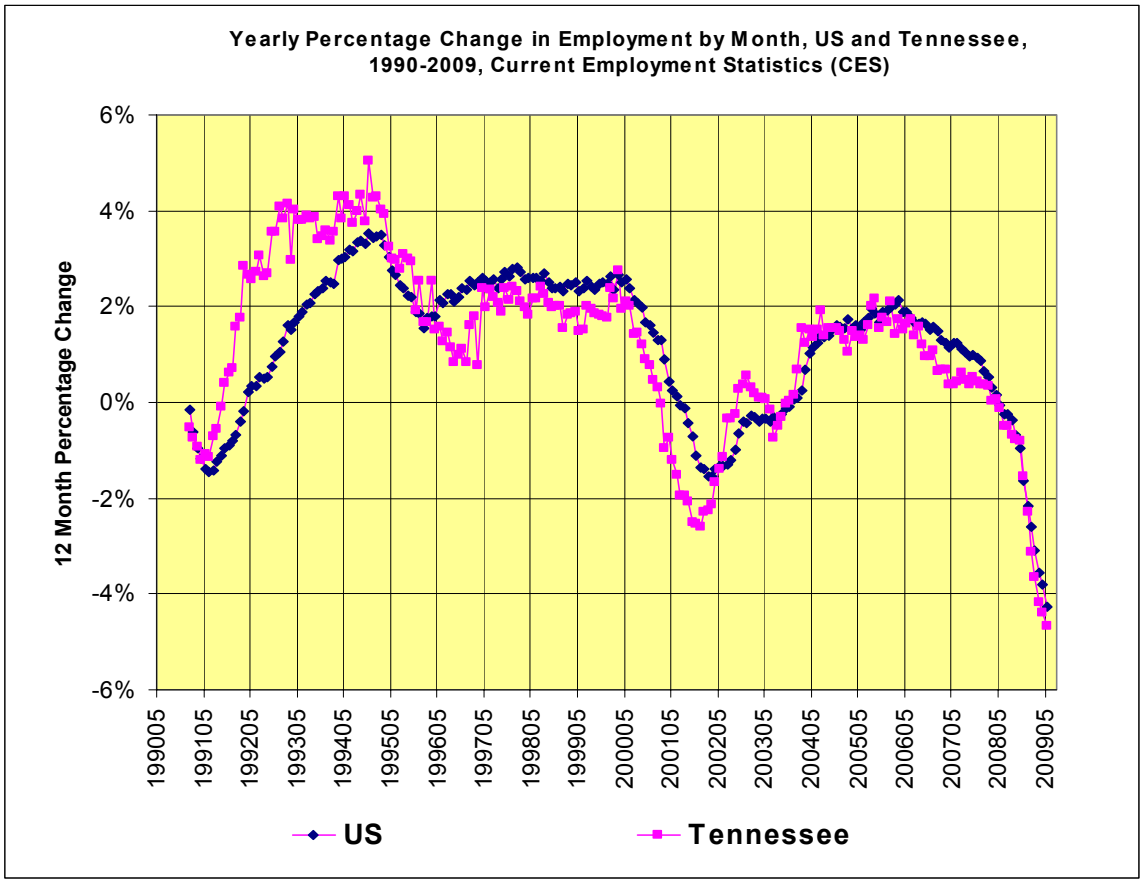


Figure 4. Yearly Percentage Change in Employment by Month, US and Tennessee, 1990-2009, Current Employment Statistics (CES)

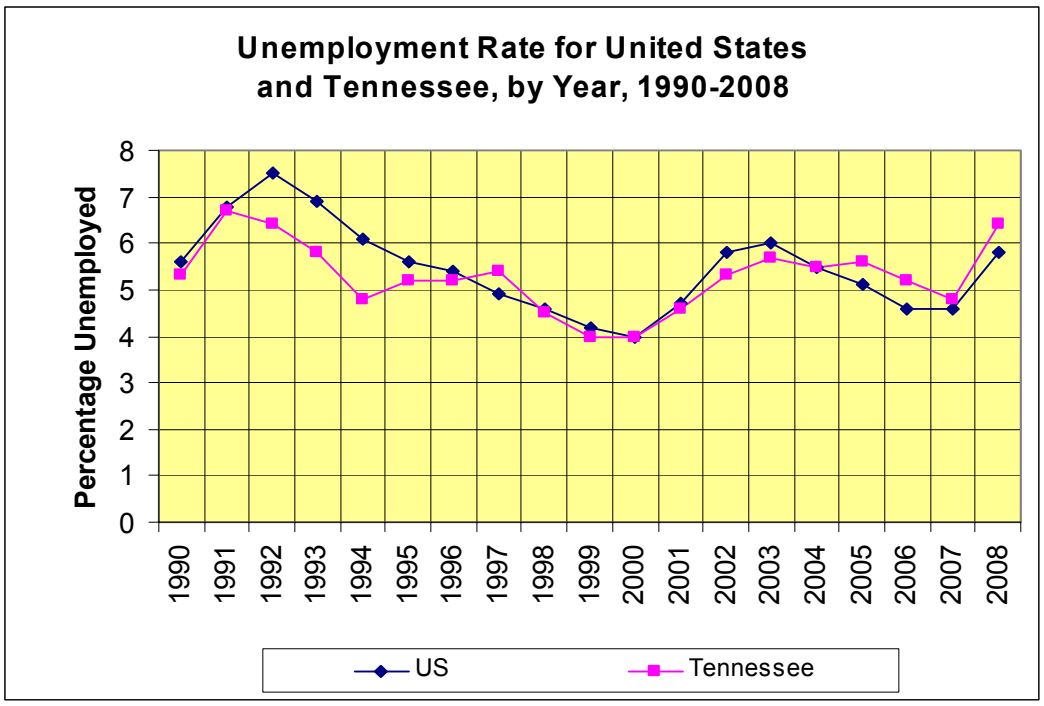


Figure 5. Unemployment Rate for United States and Tennessee, 1990-2006

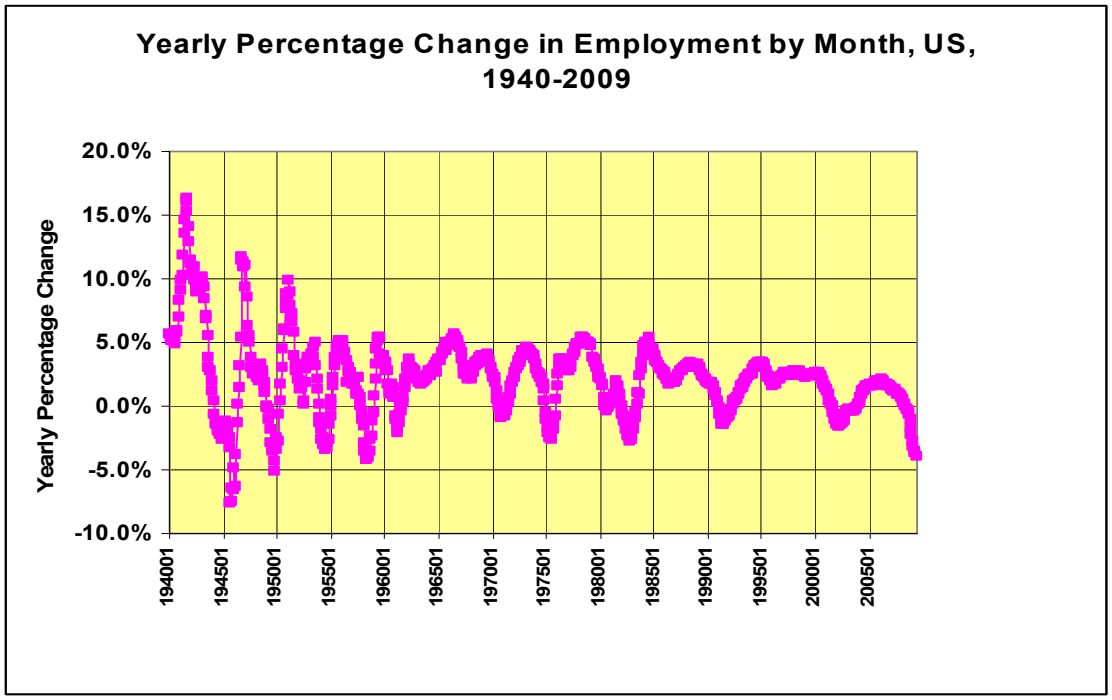


Figure 6. Yearly Percentage Change in Employment by Month, 1940-2009

Indicators Relating to Employment are Mixed

Signs Prefacing Revival Recovery from an economic downturn can occur in a variety of ways. Normally, **leading indicators** change first (Table 6, page 22). Changes in these anticipate or preface a return to good economic times.

- **Seven of 10 leading indicators had positive signs for May 2009.**

Coincident indicators include those that reflect the present state of the economy, or mirror what is now taking place.

- **Two of four coincident indicators were positive; two were negative.**

Lagging Indicators reflect the economy after its change.

- **One lagging indicator was positive; one was neutral; and one was negative**.

Sharp increases in unemployment and a somewhat stable labor force (seasonally adjusted) suggest that employment may continue to decline in the short-term. Data from 2007 and 2008 are the source from which the projections for 2006 to 2016 in the Local Workforce Investment Areas and the short-term projections for 2009 and 2010 are derived. Factors precipitating the current downturn may operate for the short-term. The question is what can be expected in the longer term?

Consumer sentiment declined from 2004 until mid-2008, and from then it stabilized, although fluctuating between lows in the 50s and a high of 70 (Figure 7, page 23). About mid-2008, checkable and savings deposits sharply increased (Figure 8, page 23). Saving had been declining for the past generation, so the revival of savings is not in itself a bad sign, with accumulated savings representing the ability of the population to withstand serious downturns. Lowered interest weakens motivation to save. Interest rates were gradually decreased from 2007 until the present, and the difference between the long-term rate (10 years) and the short-term (3 months) gradually increased at the same time (Figure 9, page 24). Gross Domestic Product (GDP, Figure 10, page 25) decreased. Durable consumption decreased sharply, and general consumption decreased slightly.

In normal cycles, when financial institutions do not need bailing out and job security is higher, changes to lower short-term interest rates, and increased difference between long-term and short-term interest rates, signal at least the beginning of the end of recession. However, with the unemployment rate increasing, it appears that potential consumers are holding onto their cash in checkable and savings deposits. Purchasing is necessary to increase consumption as well as to end the decline in durable consumption, and to revive business. Revival of business leads to an increase in employment. Should the captains of industry anticipate a certain revival of business, employment can increase as a result.

In normal cycles, these events occur in sequence with increased consumer confidence (consumer expectations, Table 6, page 22) leading to increased consumption. But with job losses mounting, even with a stabilization of confidence, consumption is not as likely to increase, unless confidence actually *increases*. The normal incentive to consume, normally triggered by lower short-term interest rates, does not work its normal magic unless confidence returns.

Table 6. Conference Board Indicators and their Status in May 2009

Leading Indicators	
	Index of Supplier Deliveries (Vendor Performance)
	Interest Rate Spread
	Stock Prices
	Real Money Supply
	Consumer Expectations
	Building Permits
	Manufacturer's New Orders for Nondefense Capital Goods
	Average Weekly Manufacturing Hours
	Average Weekly Initial Claims for Unemployment Insurance
	Manufacturers New Orders
Coincident Indicators	
	Personal Income less Transfer Payments
	Manufacturing and Trade Sales
	Industrial Production
	Employment
Lagging Indicators	
	Average Duration of Unemployment
	Commercial and Industrial Loans Outstanding
	Change in Labor Cost per Unit of Output
	Change in CPI for Services
	Ratio of Manufacturing and Trade Inventories to Sales
	Average Prime Rate Charged by Banks
	Ratio of Consumer Installment Credit to Personal Income
	Positive Contribution in May, 2009
	Held Steady in May
	Negative Contribution in May
Source: http://www.conference-board.org/economics/bci/pressRelease_output.cfm?cid=1	

While the economic indicators provide a mixed message about the speed of recovery, projections for the short-term and long-term provide a probable view of future employment in Tennessee. Short-term projections are more affected by the present state

of the economy; long-term projections are more likely a return to normal growth patterns outside the ebb and flow of specific economic cycles.

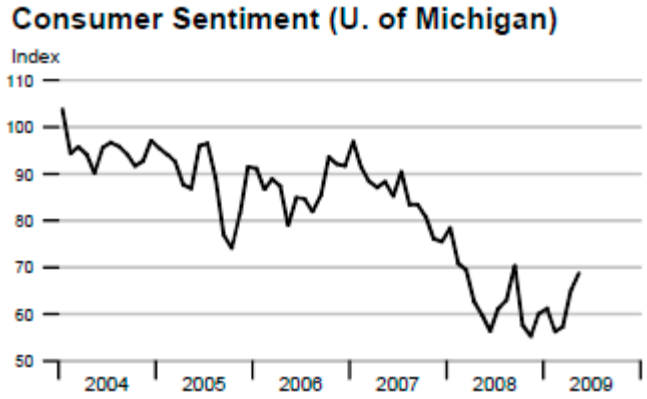


Figure 7. Consumer Sentiment, 2004 to 2009 quarter 2.

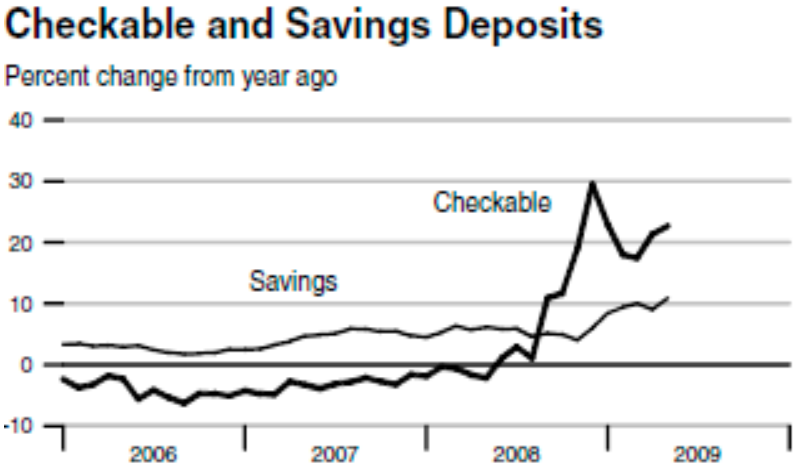


Figure 8. Checkable and Savings Deposits.

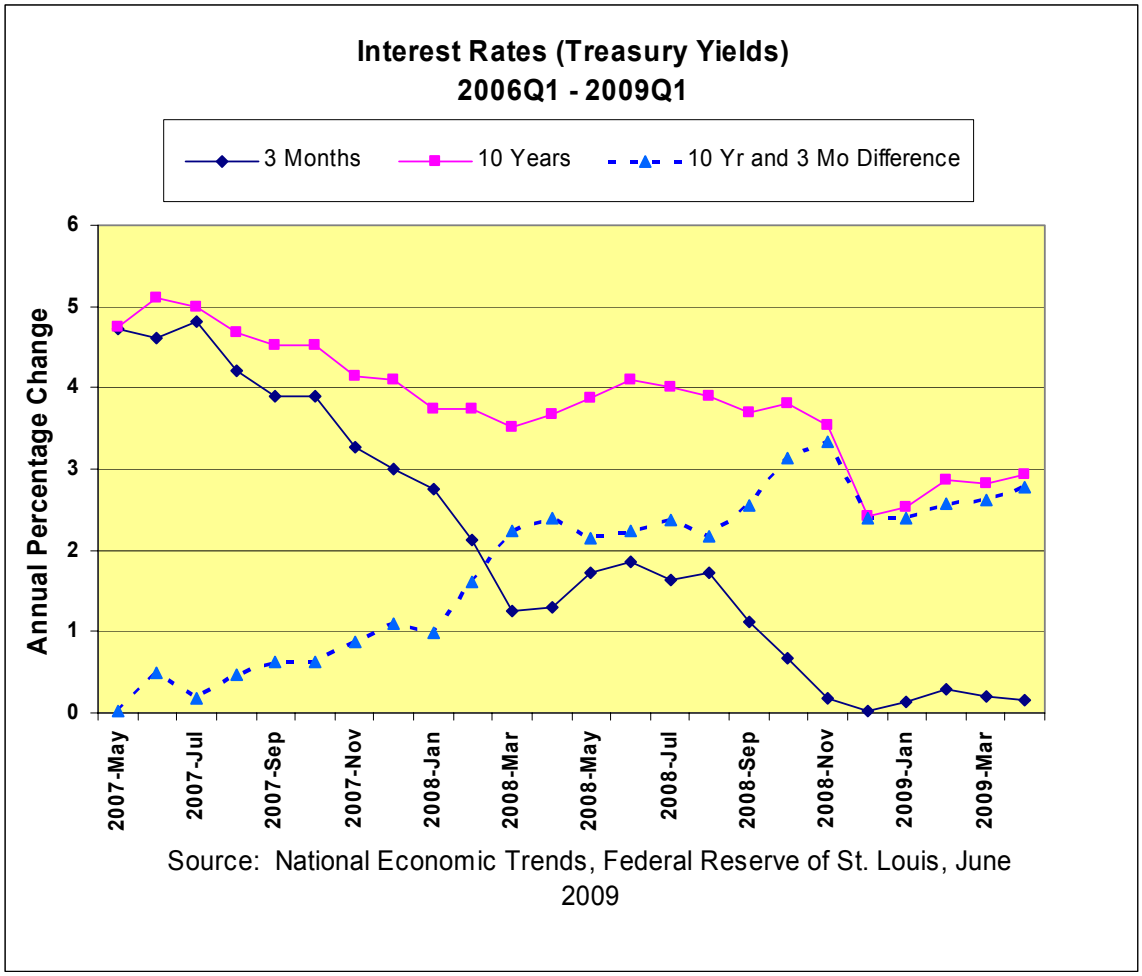


Figure 9. Interest Rates, 2006 Quarter 1 to 2009 Quarter 1

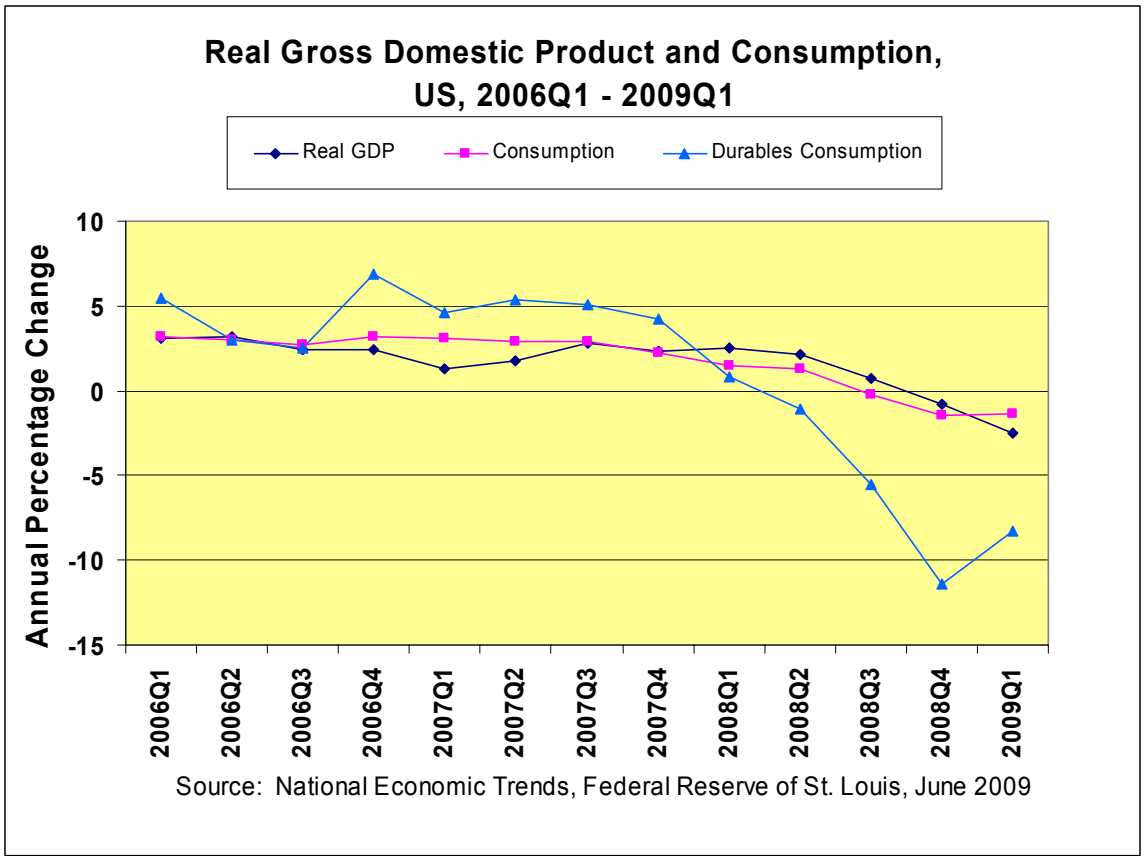


Figure 10. Real Gross Domestic Product and Consumption.

II. Short- and Long-Term Projections

Size of Industry Sector. Tennessee's employment is greatest in the sectors of trade, transportation, and utilities (over 600 thousand) and education and health services (over 500 thousand) (Table 7, page 27). Manufacturing (about 400 thousand), professional and business services (over 300 thousand), and leisure and hospitality (about 260 thousand) are leading industries. Government, financial activities, other services, and construction each have over 100 thousand employees.

- Trade, transportation, and utilities is the largest sector in Tennessee.
- Education and health services is the next largest sector.

General Growth in the Short- and Long-Term. Long-term growth is projected to be positive, an inverse of the short-term decline now being experienced. It is possible either that long-term growth can be tempered by decline in the short-term, or that the short-term declines will be mitigated soon by expected growth of the next 10 years. Growth through 2016 is expected to be about 1.2 percent (Table 7, page 27). Employment for the short-term (through 2010) is projected to decline at 0.9 percent per year (Table 8, page 27).

Detailed descriptions of long-term employment from 2006-2016 is contained in our publication "Investing for Growth in Tennessee's Workforce, 2006-2016" of August 2008 (Tennessee State Government, 2008). The short-term projections through 4th quarter 2010 described below provide a temporary snapshot of changes in the employment pictures as time advances through 2006-2016.

Table 7. Long-term Employment Projections for non-Agricultural Industry Sectors, in thousands, Tennessee, 2006-2016

Industry	2006 Estimated Employment	2016 Projected Employment	Number of New Jobs	Annual Growth Rate
Natural Resources and Mining	35.46	38.97	3.5	0.9%
Construction	130.27	157.66	27.39	1.9%
Manufacturing	399.4	375.81	-23.6	-0.6%
Trade, Transportation, and Utilities	609.82	679.05	69.23	1.1%
Information	49.46	50.31	0.85	0.2%
Financial Activities	141.43	158.09	16.66	1.1%
Professional and Business Services	317.25	386.29	69.04	2.0%
Education and Health Services	548.1	662.85	114.74	1.9%
Leisure and Hospitality	268.49	310.69	42.21	1.5%
Other Services (Except Government)	124.98	135.85	10.87	0.8%
Government	187.25	213.57	26.32	1.3%
Total	2811.9	3169.1	357.2	1.2%

Table 8. Short-term Employment Projections for non-Agricultural Industry Sectors, in thousands, Tennessee, 2008-2010

Industry	2008 Estimated Employment	2010 Projected Employment	Number of New Jobs	Annual Growth Rate
Natural Resources and Mining	36.7	34.1	-2.6	-3.6%
Construction	131.1	128.0	-3.1	-1.2%
Manufacturing	349.5	321.4	-28.1	-4.1%
Trade, Transportation, and Utilities	600.2	575.0	-25.2	-2.1%
Information	48.9	42.4	-6.5	-6.9%
Financial Activities	142.8	138.5	-4.3	-1.5%
Professional and Business Services	318.2	308.7	-9.5	-1.5%
Education and Health Services	583.4	610.8	27.4	2.3%
Leisure and Hospitality	271.4	266.2	-5.2	-1.0%
Other Services (Except Government)	134.1	137.8	3.7	1.4%
Government	208.3	209.3	1.0	0.3%
Total	2,824.6	2,772.2	-52.4	-0.9%

Short-term Employment for 2009 and 2010

About 52,400 jobs are expected to be lost from the 4th quarter of 2008 to the 4th quarter of 2010 (Table 8, page 27). These are expected to occur both in goods-producing and service-providing industries, with the highest rates of decline in the information and manufacturing sectors. Occupational groups expected to decline include production, transportation, and sales.

Changes in Industries

Service-providing industries are contracting slightly. Goods-producing industries show significant downsizing. Growing industries are affected positively by demographic factors such as growth in the school-age and retiree population.

- **Employment in Tennessee is likely to decline 0.9 percent per year during 2009 and 2010 (**Table 9, page 31**).**
- **Service-providing industries show a modest decline of 0.4 percent per year for the short-term (**Table 9**).**
- **Goods-producing industries are projected to decline at 3.3 percent per year (**Table 9**).**

There is a significant downturn in information and manufacturing but growth in some service-providing industries. Education and health services as well as other services are expected to increase. These industries are closely tied to the educational needs of Tennessee's younger population, and the health needs of its older population.

- **Information industries are likely to decline during 2009 and 2010 at 6.9 percent per year. The publishing, software, motion picture, and cable industries show significant decline.**
- **Manufacturing is declining for the short-term, with durable manufacturing expected to decline more than 3 percent per year, and nondurable and natural resources manufacturing declining at similar percentages per year.**
- **Industries serving persons in education and health show employment growth of 2.3 percent through the economic decline.**
- **Other services are expected to grow 1.4 percent.**

Government is likely to grow slightly by 0.3 percent per year. Construction, financial activities, and leisure and hospitality are likely to decline at about one percent or more per year. Trade, transportation, and utilities as well as natural resources and mining are likely to decline more than two percent.

Leading Industry Sub-Sectors. Health care and social assistance lead with 3.0 percent growth per year (Table 9, page 31). Educational Services is growing at a more moderate 1.3 percent. Wholesale trade is projected to grow at 1.9 percent. Retail trade is likely to decline at 2.4 percent. Lagging industries include administrative and support and waste management and remediation as well as real estate and rental and leasing. A revival in residential and nonresidential investment would mitigate decline and possibly provide some growth in real estate employment.

Growth in law, community and social services, healthcare, education, and personal care services, while not considered robust economy builders, nevertheless contribute to a society fatigued and overstocked to some extent by technology and products and reaching out to the persistent needs of its population. The population can do without things, at least for a time, but eventually the excess capacity of an earlier period will be re-tooled for the creation of goods the population once again needs.

The detailed industry with the highest expected growth is wholesale electronic markets and agents and brokers at 8.4 percent (Table 10, page 32). Broadcasting (except for the Internet), water transportation, and support activities show growth rates of 5.7, 5.2, and 5.2 percent per year, respectively. Rapidly-growing industries with large employment include ambulatory health care services; hospitals; local government; educational services; food service and drinking places; and professional, scientific, and technical services.

Changes in Occupations

Major Groups of Occupations. Healthcare and various educational occupations are frequently among the major growing occupations. Healthcare occupations are expected to grow nearly 3.0 percent per year (Table 11, page 33). Legal occupations are the top growth group at 6.4 percent per year. Personal care and service occupations are growing at 1.2 percent per year. Occupations involved in production, transportation, sales, farming, installation and maintenance, computers, and management are among the groups expected to decline. An increase in consumer confidence, wages, and consumption would improve these declining groups.

Detailed Occupations. Occupations are listed by growth rates and the number of new jobs they are expected to offer. Among the detailed occupations (Table 12, page 34), legal secretaries, veterinary assistants and laboratory animal caretakers, tire builders, paralegals and legal assistants, lawyers, photographers, rehabilitation counselors, announcers, psychiatric technicians, hairdressers, and directors of religious activities are projected to have strong growth rates above 5.0 percent per year in 2008 and 2009.

Expanding occupations include clergy, dental hygienists, mental health counselors, home health aides, mental health and substance abuse counselors, dental assistants, pharmacy technicians, surgical technologists, and self-enrichment education teachers.

Unemployment is one road to poverty for an individual; another is cataclysmic illness. For those who have lost jobs there must be retraining to prepare for occupations with openings. The growth of educational occupations is helpful, with demand for teachers who can prepare the unemployed for new work.

For those with illnesses, the healthcare system can help bring the person back to health and to a continuing productive work career. The healthcare system, job training, and efficiency of the market are important factors in maintaining the general welfare of the population.

Poverty is a measure of those unemployed, those employed at wages below the level for sustaining healthy lifestyles, and those who cannot work. The next section discusses recent trends in poverty, education, and earnings and the distribution of industries and occupations across the Local Workforce Investment Areas of Tennessee and the U.S.

Table 9. Jobs Gained and Lost with Annual Wages for Industry Major Groups, Ranked by Projected Growth Rate, 2009 and 2010

(thousands)

NAICS	Industry	G/S	Estimate 2008 Qtr 4	Projection 2010 Qtr 4	# Jobs Gain/ Lost	% Grwth / Year	2007Q2 Avg. Ann.
	Total Employment, All Jobs except Self-Employed and Unpaid Family Workers		2,824.6	2,772.2	-52.4	-0.9%	$37.40
	Goods-Producing	**G**	517.3	483.5	-33.8	-3.3%	$42.70
	Service-Providing	**S**	2,307.3	2,288.7	-28.1	-0.4%	$36.20
62	Health Care and Social Assistance	S	345.9	367.2	21.2	3.0%	$40.20
42	Wholesale Trade	S	131.3	136.3	5.0	1.9%	$53.00
81	Other Services (Except Government)	S	134.1	137.8	3.7	1.4%	$26.20
61	Educational Services	S	237.4	243.6	6.2	1.3%	$39.20
71	Arts, Entertainment, and Recreation	S	29.6	30.1	0.5	0.8%	$28.80
54	Professional, Scientific, and Technical Services	S	107.4	109	1.6	0.7%	$53.40
55	Management of Companies and Enterprises	S	24.3	24.6	0.3	0.6%	$68.70
22	Utilities	S	3.4	3.4	0.0	0.4%	$60.30
99	Government	S	208.3	209.3	1.0	0.3%	$39.10
52	Finance and Insurance	S	108.6	106.7	-1.9	-0.9%	$57.80
23	Construction	G	131.1	128	-3.1	-1.2%	$38.80
72	Accommodation and Food Services	S	241.7	236.1	-5.6	-1.2%	$14.80
44	Retail Trade	S	212.6	202.7	-9.9	-2.4%	$25.30
11	Agriculture, Forestry, Fishing and Hunting	G	33.5	31.6	-1.9	-2.9%	$25.80
56	Administrative and Support and Waste Management and Remediation	S	186.5	175.1	-11.3	-3.1%	$28.30
53	Real Estate and Rental and Leasing	S	34.1	31.8	-2.4	-3.5%	$35.40
31	Manufacturing	G	52	48.2	-3.8	-3.7%	$45.50
48	Transportation and Warehousing	S	89.6	82.9	-6.7	-3.8%	$45.90
51	Information	S	48.9	42.4	-6.5	-6.9%	$48.00
21	Mining	G	3.2	2.5	-0.6	-10.4%	$49.60

Table 10. Growing Industries in Tennessee, 2009 and 2010, 1500+ Estimate

NAICS	Occupations	Estimate 2008 Quarter 4	Projection 2010 Quarter 4	Annual Growth Rate
425000	Wholesale Electronic Markets and Agents and Brokers	17,700	20,683	8.4%
515000	Broadcasting (except Internet)	8,824	9,821	5.7%
483000	Water Transportation	2,268	2,504	5.2%
488000	Support Activities for Transportation	10,805	11,924	5.2%
446000	Health and Personal Care Stores	24,500	26,833	4.8%
448000	Clothing and Clothing Accessories Stores	30,634	33,079	4.0%
813000	Religious, Grantmaking, Civic, Professional, and Similar Organizations	65,718	70,670	3.8%
621000	Ambulatory Health Care Services	119,634	128,301	3.6%
622000	Hospitals	130,445	139,567	3.5%
492000	Couriers and Messengers	37,373	39,967	3.5%
713000	Amusement, Gambling, and Recreation Industries	18,283	19,317	2.8%
423000	Merchant Wholesalers, Durable Goods	67,500	70,728	2.4%
562000	Waste Management and Remediation Service	7,709	8,051	2.2%
485000	Transit and Ground Passenger Transport	5,846	6,079	2.0%
623000	Nursing and Residential Care Facilities	54,634	56,803	2.0%
481000	Air Transportation	6,618	6,838	1.7%
624000	Social Assistance	41,234	42,491	1.5%
930000	Local, Excluding Education and Hospitals	112,951	116,033	1.4%
611000	Educational Services	237,411	243,632	1.3%
444000	Building Material and Garden Equipment and Supplies Dealers	25,933	26,420	0.9%
531000	Real Estate	21,798	22,193	0.9%
722000	Food Services and Drinking Places	209,033	212,800	0.9%
524000	Insurance Carriers and Related Activities	40,859	41,467	0.7%
541000	Professional, Scientific, and Technical Services	107,392	108,956	0.7%
551000	Management of Companies and Enterprises	24,333	24,619	0.6%

Table 11. Projections of Major Groups of Occupations, Tennessee, 2009 and 2010

SOC	Title	2008 Quarter 4	2010 Quarter 4	Job Growth	Annual Growth Rate
00-0000	Total, All Occupations	3,019,661	2,961,839	-57,822	-1.0%
23-0000	Legal Occupations	14,386	16,280	1,894	6.4%
21-0000	Community and Social Services Occupations	52,300	55,872	3,572	3.4%
29-0000	Healthcare Practitioners and Technical Occupations	174,758	185,351	10,593	3.0%
31-0000	Healthcare Support Occupations	74,594	78,933	4,339	2.9%
25-0000	Education, Training, and Library Occupations	161,621	165,631	4,010	1.2%
39-0000	Personal Care and Service Occupations	76,771	78,561	1,790	1.2%
19-0000	Life, Physical, and Social Science Occupations	15,355	15,577	222	0.7%
35-0000	Food Preparation and Serving Related Occupations	241,048	242,554	1,506	0.3%
33-0000	Protective Service Occupations	62,180	61,833	-347	-0.3%
17-0000	Architecture and Engineering Occupations	36,329	35,847	-482	-0.7%
13-0000	Business and Financial Operations Occupations	94,141	92,414	-1,727	-0.9%
37-0000	Building and Grounds Cleaning and Maintenance Occupations	113,308	111,121	-2,187	-1.0%
43-0000	Office and Administrative Support Occupations	487,408	477,544	-9,864	-1.0%
27-0000	Arts, Design, Entertainment, Sports, and Media Occupations	44,210	43,071	-1,139	-1.3%
47-0000	Construction and Extraction Occupations	138,380	134,784	-3,596	-1.3%
11-0000	Management Occupations	189,475	184,279	-5,196	-1.4%
15-0000	Computer and Mathematical Occupations	40,560	39,277	-1,283	-1.6%
49-0000	Installation, Maintenance, and Repair Occupations	126,848	121,770	-5,078	-2.0%
45-0000	Farming, Fishing, and Forestry Occupations	25,336	24,044	-1,292	-2.6%
41-0000	Sales and Related Occupations	292,900	277,585	-15,315	-2.6%
53-0000	Transportation and Material Moving Occupations	265,055	248,821	-16,234	-3.1%
51-0000	Production Occupations	292,698	270,690	-22,008	-3.8%

Source: Tennessee Department of Labor and Workforce Development
Employment Security Division, Research and Statistics Section, 6/30/2009

Table 12. Projections of Top 25 Detailed Occupations by Growth Rate, 1500+ Employees with Wages and Training, Tennessee, 2009 and 2010

SOC	Title	Est. 2008 Qrtr 4	Proj. 2010 Qrtr 4	Ann. Gr. Rate	Median Annual Wage**	TR*
43-6012	Legal Secretaries	3,366	3,988	9.2%	$32,410	7
31-9096	Veterinary Assistants and Laboratory Animal Caretakers	1,552	1,823	8.7%	$19,810	7
51-9197	Tire Builders	2,105	2,460	8.4%	$55,640	9
23-2011	Paralegals and Legal Assistants	3,812	4,448	8.3%	$36,920	6
23-1011	Lawyers	8,192	9,319	6.9%	$93,430	1
27-4021	Photographers	3,087	3,480	6.4%	$22,410	9
21-1015	Rehabilitation Counselors	2,142	2,388	5.7%	$21,720	3
27-3010	Announcers	1,706	1,889	5.4%	$20,690	9
29-2053	Psychiatric Technicians	1,712	1,893	5.3%	$23,060	6
39-5012	Hairdressers, Hairstylists, and Cosmetologists	10,206	11,269	5.2%	$23,440	7
21-2021	Directors, Religious Activities and Education	5,707	6,283	5.1%	$59,230	5
21-2011	Clergy	11,549	12,688	4.9%	$44,350	3
29-2021	Dental Hygienists	3,252	3,568	4.9%	$56,160	6
21-1014	Mental Health Counselors	3,179	3,485	4.8%	$25,990	3
31-1011	Home Health Aides	11,832	12,965	4.8%	$18,720	11
21-1023	Mental Health and Substance Abuse Social Workers	2,967	3,249	4.8%	$28,910	3
31-9091	Dental Assistants	5,386	5,897	4.7%	$30,060	7
29-2052	Pharmacy Technicians	8,645	9,450	4.7%	$26,080	6
29-2055	Surgical Technologists	3,281	3,566	4.3%	$35,080	6
25-3021	Self-Enrichment Education Teachers	3,144	3,403	4.1%	$29,810	8
39-9041	Residential Advisors	2,018	2,177	3.9%	$18,850	10
25-1071	Health Specialties Teachers, Postsecondary	2,749	2,951	3.7%	$61,770	2
27-2041	Music Directors and Composers	1,638	1,756	3.6%	$19,740	4
29-1126	Respiratory Therapists	2,812	3,014	3.6%	$44,620	3
39-9021	Personal and Home Care Aides	12,980	13,906	3.6%	$17,960	11

*TR (Training): 1: 1 Prof, 2: Ph.D., 3: MA, 4: BA+Work, 5:BA, 6: AA, 7: Post Secondary, 8: Related Work Experience, 9: Long-term Training, 10: Moderate Term, 11: Short-term, **Wages are 2007

Source: Tennessee Department of Labor and Workforce Development
Employment Security Division, Research and Statistics Section, 6/30/2009

III. Educational Attainment, Income, Poverty, and Unemployment Within Local Workforce Investment Areas

Educational attainment varies across the Local Workforce Investment Areas of Tennessee. Education is integral to occupations and industries, with each industry composed of multiple occupations, each having unique skill and educational requirements. The skill and training required in some workforce areas insures a proportion of highly educated workers, but this does not necessarily rule out substantial poverty existing alongside.

Poverty is more prevalent in Tennessee than in the US. Poverty tends to be a rural phenomenon, except for specific urban areas that have substantial poverty. High unemployment brings greater poverty, even as poverty hampers educational attainment and job acquisition.

Poverty is more prevalent in areas with higher proportions of residents without high school diplomas, while bachelor's degrees are correlates of lower unemployment. Higher rates of high school graduation create opportunities for more students to get college degrees that can act as buffers against unemployment. Policies that lessen the frequency of poverty and mitigate its negative effects are essential to lowering the unemployment rate.

Increase in Poverty in Tennessee and the U.S.

Recent data show that poverty in the U.S. has increased since 2001, both at 100 percent and 125 percent of the poverty line (100 percent poverty in Figure 11, page 36; 125 percent poverty in Figure 12, page 37).

Recent increases in poverty suggest that policies may be necessary to avert greater increases. The rate of growth of poverty in Tennessee has surpassed that of the nation from 2001 to 2006 (Figure 13, page 37). Tennessee's 100 percent poverty rate has increased more sharply relative to the nation than its 125 percent rate. The nation is becoming more poor like Tennesee, but Tennessee is becoming much poorer than the nation.

The current increase in the unemployment rate is a concern since poverty shadows that increase. Poverty is a daily fact for a significant fraction of the population. Poverty is undesirable since it clearly contributes to negative social phenomena such as poor health status and malnutrition, low educational achievement, pronounced income gaps, social dislocation, and higher crime rates.

Knowledge of the root causes provides the keys to poverty's eventual demise. Poor

health, cataclysmic health events, unemployment, and low education can produce poverty. It is desirable to remove or control the factors producing poverty. Any improvement in the employment picture in Tennessee will likely decrease poverty, but there are other focused and effective solutions as well.

There are other factors related to poverty. Wages are critical to insure that poor families not try to save money by limiting the purchase of healthy food. Energy prices and health costs can also squeeze the little earnings the poor have so that items necessary to their well-being are not sacrificed. Predatory financial practices can be a leading cause of poverty. Training to reduce debt and build assets is essential (Burd-Sharps). Financial literacy training is now required in Tennessee high schools.

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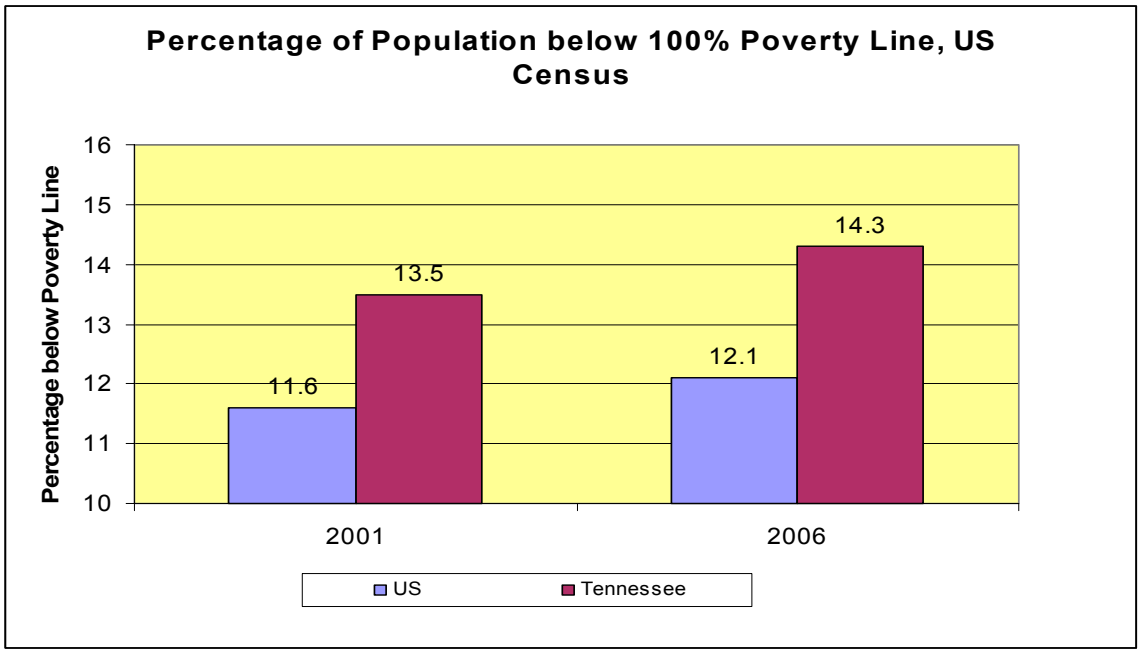

Figure 11. Percentage of Population below 100 % Poverty Line.

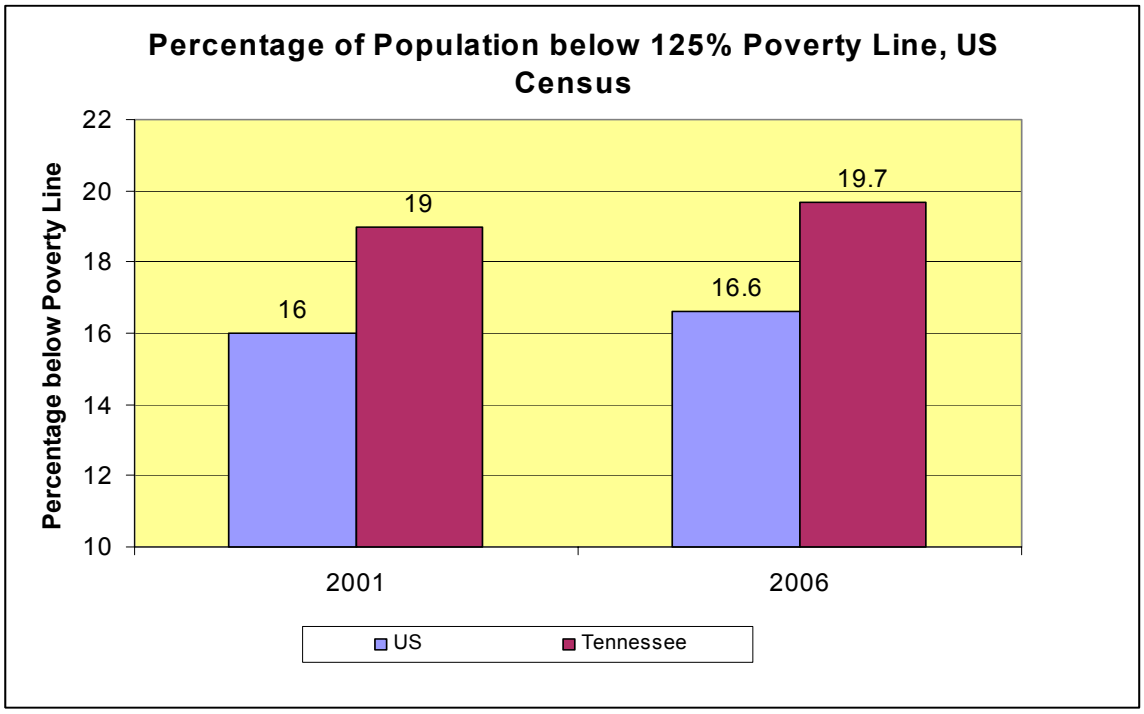

Figure 12. Percentage of Population below 125% of the Poverty Line.

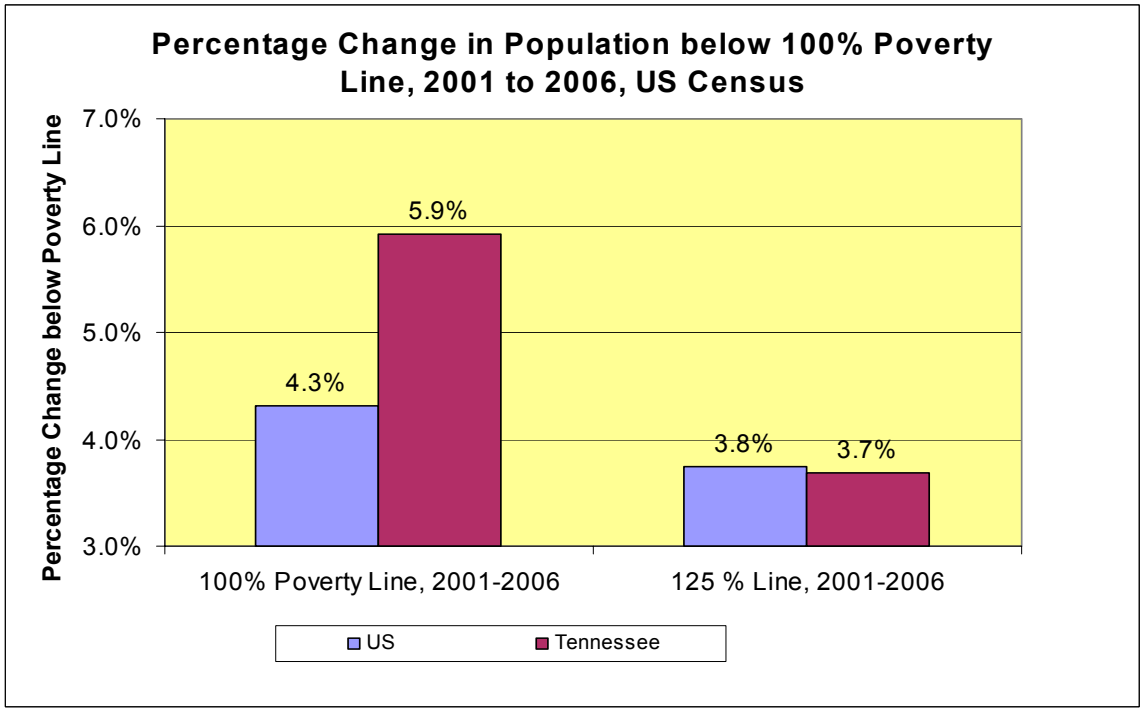

Figure 13. Percentage Change in Population below 100 % Poverty Line, 2001-2006.

Education and Workforce Areas

Some Workforce Areas have lower average unemployment rates than others (Table 13, page 38). Workforce Areas for Knoxville (3), Davidson (9), Land between Lakes (8), and Shelby County (13) Tennessee have lower unemployment. Areas with higher unemployment include the Workforce Areas of Duck River (10), Reelfoot (12), Jackson (11), National Parks (2), High Tech (4), North Cumberland (7), Elk River (6), and Hamilton (5).

Weak Association between Civilian Labor Force and Unemployment

There is a weak association between size of labor force and unemployment rate (Table 13, page 38). The largest LWIA (9) has 9.1 percent unemployed, while the smallest LWIA (12) has 13.5 percent unemployment. LWIA 5 (Hamilton) is a fairly large LWIA but has 10.1 percent unemployment (about the state level). The relationship is weak at about 0.40 to 0.50 Pearson r, enough to account for only 25 percent of unemployment.

Table 13. Employment, Unemployment, and Unemployment Rate in LWIAs, May 2009

LWIA	Location	Civilian Labor Force	Employment	Unemployment	Unemployment Rate (%)
0	Tennessee	3,025,900	2,713,300	312,600	10.3
1	Tri-Cities	181,040	164,170	16,870	9.3
2	National Park	214,890	188,260	26,660	12.4
3	Knox	224,030	206,220	17,810	7.9
4	High Tech	223,630	198,120	25,530	11.4
5	Hamilton	286,170	257,250	28,940	10.1
6	Elk River	113,350	101,220	12,120	10.6
7	North Cumberland	110,920	97,310	13,590	12.2
8	Land between Lakes	326,590	296,330	30,270	9.2
9	Davidson	511,860	464,950	46,900	9.1
10	Duck River	106,060	91,550	14,530	13.6
11	Jackson	169,930	148,160	21,820	12.8
12	Reelfoot Lake	102,650	88,740	13,910	13.5
13	Shelby	454,740	411,050	43,690	9.6

Table 14. Employment, Unemployment, and Unemployment Rates for Counties by LWIA, May 2009

Area Name	LWIA	Civilian Labor Force	Employment	Unemployment	Unemploy-ment Rate (%)
Tennessee	**0**	**3,025,900**	**2,713,300**	**312,600**	**10.3**
Carter County	1	29,680	26,730	2,950	9.9
Johnson County	1	7,460	6,570	890	12
Sullivan County	1	74,200	67,450	6,750	9.1
Unicoi County	1	8,590	7,550	1,040	12.1
Washington County	1	61,110	55,870	5,240	8.6
Claiborne County	2	13,090	11,520	1,580	12
Cocke County	2	17,160	14,950	2,220	12.9
Grainger County	2	10,400	8,980	1,420	13.6
Greene County	2	31,110	26,300	4,810	15.5
Hamblen County	2	30,770	26,870	3,900	12.7
Hancock County	2	2,620	2,260	360	13.7
Hawkins County	2	27,500	23,910	3,600	13.1
Jefferson County	2	24,590	21,570	3,010	12.3
Sevier County	2	48,860	44,060	4,800	9.8
Union County	2	8,790	7,840	960	10.9
Knox County	3	224,030	206,220	17,810	8
Anderson County	4	35,580	31,930	3,650	10.3
Blount County	4	62,490	56,140	6,350	10.2
Campbell County	4	16,960	14,750	2,220	13.1
Cumberland County	4	21,830	19,410	2,420	11.1
Loudon County	4	23,040	20,810	2,230	9.7
Monroe County	4	19,510	15,990	3,520	18
Morgan County	4	8,590	7,560	1,030	12
Roane County	4	27,170	24,640	2,530	9.3
Scott County	4	8,460	6,890	1,580	18.6
Bledsoe County	5	5,010	4,330	680	13.5
Bradley County	5	46,560	42,160	4,410	9.5
Hamilton County	5	165,310	150,830	14,480	8.8
Marion County	5	13,090	11,520	1,570	12
McMinn County	5	24,180	20,670	3,510	14.5
Meigs County	5	5,270	4,490	780	14.8
Polk County	5	7,120	6,200	920	12.9
Rhea County	5	13,370	11,570	1,800	13.4
Sequatchie County	5	6,260	5,480	790	12.5
Bedford County	6	23,100	20,430	2,660	11.5
Coffee County	6	25,960	23,190	2,770	10.7
Franklin County	6	20,080	18,020	2,060	10.3
Grundy County	6	6,080	5,220	860	14.1
Lincoln County	6	17,010	15,900	1,110	6.5
Moore County	6	3,140	2,860	270	8.7
Warren County	6	17,980	15,600	2,390	13.3

Table 14, continued Area Name	LWIA	Civilian Labor Force	Employment	Unemployment	Unemployment Rate (%)
Cannon County	7	6,570	5,730	830	12.7
Clay County	7	3,420	2,930	490	14.3
DeKalb County	7	9,850	8,790	1,060	10.8
Fentress County	7	7,770	6,760	1,010	13
Jackson County	7	4,880	4,180	700	14.3
Macon County	7	10,640	9,290	1,340	12.6
Overton County	7	9,930	8,510	1,420	14.3
Pickett County	7	1,790	1,540	260	14.3
Putnam County	7	33,940	30,630	3,310	9.7
Smith County	7	9,280	8,090	1,180	12.8
Van Buren County	7	2,470	2,100	370	15
White County	7	10,380	8,760	1,620	15.6
Cheatham County	8	20,360	18,470	1,890	9.3
Dickson County	8	23,740	20,950	2,790	11.8
Houston County	8	3,930	3,430	500	12.7
Humphreys County	8	9,150	7,980	1,180	12.8
Montgomery County	8	65,960	60,110	5,860	8.9
Robertson County	8	32,960	29,590	3,370	10.2
Stewart County	8	5,800	5,070	730	12.6
Sumner County	8	79,390	71,290	8,100	10.2
Williamson County	8	85,300	79,440	5,850	6.9
Davidson County	9	320,220	292,540	27,680	8.6
Rutherford County	9	131,090	117,590	13,500	10.3
Trousdale County	9	3,710	3,250	460	12.4
Wilson County	9	56,840	51,570	5,260	9.3
Giles County	10	13,810	11,870	1,950	14.1
Hickman County	10	10,230	8,940	1,300	12.7
Lawrence County	10	17,100	14,640	2,460	14.4
Lewis County	10	5,490	4,650	840	15.2
Marshall County	10	12,770	10,760	2,010	15.7
Maury County	10	36,970	32,610	4,360	11.8
Perry County	10	3,020	2,280	740	24.6
Wayne County	10	6,670	5,800	870	13
Benton County	11	7,230	6,260	970	13.4
Carroll County	11	14,010	11,800	2,210	15.8
Chester County	11	7,820	6,990	830	10.6
Decatur County	11	5,720	4,980	740	12.9
Hardeman County	11	11,630	10,220	1,420	12.2
Hardin County	11	12,200	10,720	1,490	12.2
Haywood County	11	9,030	7,530	1,510	16.7
Henderson County	11	12,830	10,620	2,220	17.3
Henry County	11	13,570	11,770	1,800	13.3
Madison County	11	48,620	43,430	5,200	10.7
McNairy County	11	11,640	10,010	1,630	14
Weakley County	11	15,630	13,830	1,800	11.5
Crockett County	12	6,390	5,590	800	12.5
Dyer County	12	17,810	15,170	2,640	14.8

Table 14, continued Area Name	LWIA	Civilian Labor Force	Employment	Unemployment	Unemployment Rate (%)
Gibson County	12	21,760	18,580	3,180	14.6
Lake County	12	2,690	2,410	280	10.4
Lauderdale County	12	10,360	8,370	1,990	19.2
Obion County	12	15,090	13,610	1,480	9.8
Tipton County	12	28,550	25,010	3,540	12.4
Fayette County	13	17,700	15,760	1,940	11
Shelby County	13	437,040	395,290	41,750	9.6

Poverty Moderately Correlated with Low Percentages of High School Graduates

Studies show that education is critical for reducing unemployment and increasing personal income (Table 15, page 41). Educational attainment (measured by the percentage of the population with a high school diploma) is highest in Knox County in Workforce Area 3, which is followed closely by Land between Lakes as Workforce Area 8 (which includes Williamson County), Davidson County in Workforce Area 9, and Shelby County in Workforce Area 13 (Table 16, page 42). Hamilton County, Workforce Area 5, also ranks relatively high. Most other Workforce Areas are close in rank. The Upper Cumberland Mountain area north of Interstate 40, Workforce Area 7, is at the bottom. Poverty is correlated with rural location (Center for Business and Economic Research, 2007, 47) and with unemployment. Poverty is related to LWIAs with relatively low percentages of high school graduation (Figure 14, page 43). Shelby County, an urban area, also has high poverty rates (Table 17, page 43).

Table 15. Unemployment Rate and Median Weekly Earnings by Educational Attainment, US, 2008, Current Population Survey

Unemployment Rate	Education Attainment	Median Weekly Earnings
2.0%	Professional degree	$1,555
1.7%	Doctoral degree	$1,522
2.4%	Master's degree	$1,228
2.8%	Bachelor's degree	$978
3.7%	Associate degree	$736
5.1%	Some college, no degree	$645
5.7%	High-school graduate	$591
9.0%	Less than a high school	$426

Kendall tau Unemployment Rate with Education tau = 1.000, Probability = .00083
Kendall tau of Median Weekly Earnings with Education tau = 0.928, Probability = .00198
Data are 2008 annual averages for persons 25 and over. Earnings are full-time wage

Source: Bureau of Labor Statistics, Current Population Survey

Table 16. Educational Attainment by Workforce Area, Tennessee, 2005

Workforce Area	Location	Population	Number with HS diploma	Number with BA	PCT with HS Diploma	PCT with BA
0	State	6,038,800	4,583,450	1,183,610	75.9%	19.6%
7	North Cumberland	232,550	152,190	27,400	65.4%	11.8%
2	National Park	429,390	292,430	48,070	68.1%	11.2%
12	Reelfoot Lake	224,440	155,300	22,720	69.2%	10.1%
6	Elk River	229,670	161,120	29,460	70.2%	12.8%
11	Jackson	360,170	255,270	48,130	70.9%	13.4%
10	Duck River	237,280	168,860	24,850	71.2%	10.5%
4	High Tech	469,010	341,790	69,270	72.9%	14.8%
1	Tri-Cities	362,420	267,780	64,600	73.9%	17.8%
5	Hamilton	570,420	429,610	104,960	75.3%	18.4%
13	Shelby	947,540	761,930	235,210	80.4%	24.8%
9	Davidson	919,370	747,780	249,990	81.3%	27.2%
8	Land between Lakes	644,570	526,280	150,000	81.6%	23.3%
3	Knox	411,970	339,870	119,470	82.5%	29.0%

Source: US Census, http://quickfacts.census.gov/qfd/download_data.html, 2005 Data, derived and compiled by Department of Labor and Workforce Development, Research and Statistics, 6/29/2007

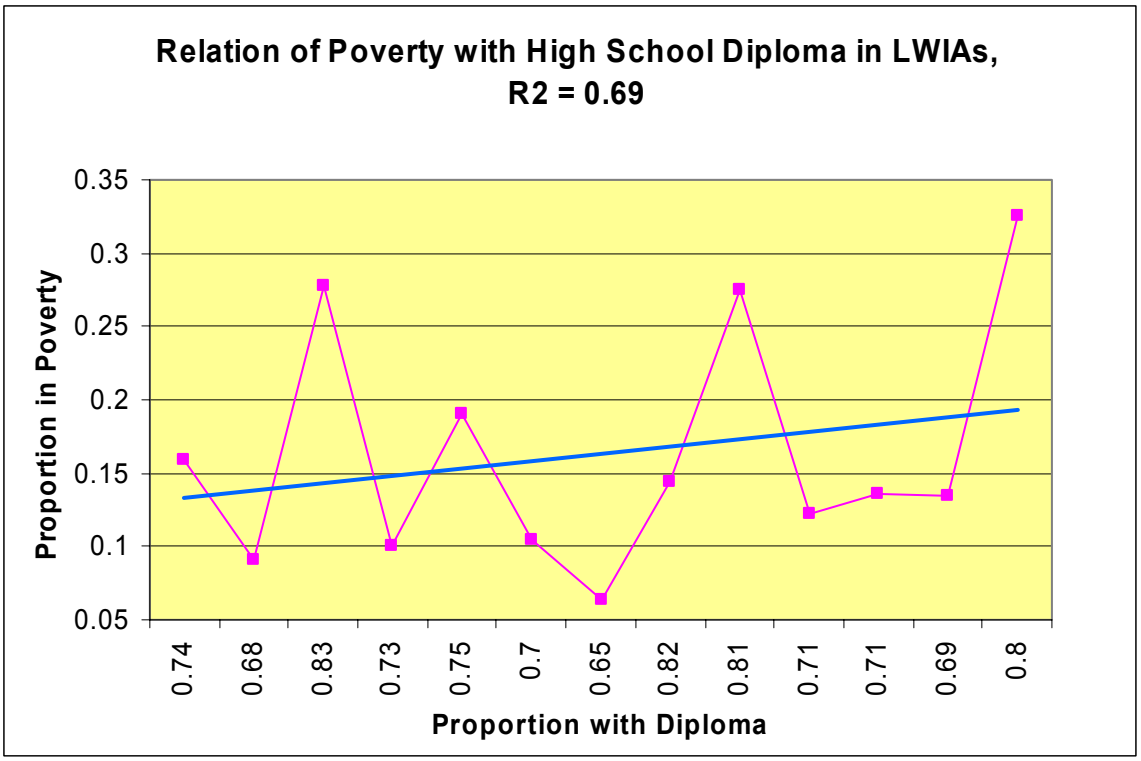

Figure 14. Relation of Poverty with High School Diploma in LWIAs

Table 17. Number of Poor, Workforce Areas in Tennessee, 2004

Work-force Area	Location	2000 Number in Poverty	2000 Percent in Poverty	2000 Popula-tion	2004 Number in Poverty	2004 Percent in Poverty	2004 Popula-tion	Growth in Poverty Percent
7	North Cumberland	33,550	15.3%	218,990	36,860	16.3%	224,390	6.3%
2	National Park	59,500	14.9%	399,050	68,120	16.3%	412,980	9.1%
11	Jackson	50,920	14.9%	342,510	58,530	16.9%	345,720	13.6%
13	Shelby	130,390	14.2%	915,780	175,710	18.9%	930,320	32.5%
12	Reelfoot Lake	29,720	14.0%	211,810	34,370	15.9%	214,280	13.5%
6	Elk River	29,140	13.6%	213,960	33,670	15.0%	221,030	10.4%
4	High Tech	58,150	13.4%	434,450	67,190	14.7%	450,500	10.0%
1	Tri-Cities	45,720	13.3%	344,570	53,880	15.4%	348,550	15.9%
10	Duck River	28,360	12.9%	219,480	33,260	14.5%	227,300	12.2%
5	Hamilton	67,610	12.5%	542,870	82,140	14.8%	552,490	19.1%
3	Knox	40,520	10.8%	375,190	54,650	13.8%	389,850	27.8%
9	Davidson	87,880	10.6%	832,030	118,070	13.5%	862,980	27.5%
8	Land between Lakes	48,110	8.4%	570,480	60,330	9.6%	606,610	14.4%
	Tennessee	709,560	12.6%	5,631,390	876,760	15.0%	5,845,090	19.0%
	United States (thousands)	31,581	11.3%	279,479	37,040	12.7%	291,652	12.4%

Source: US Census Bureau Small Area Income and Poverty Estimates, Table Created by Department of Labor and Workforce Development, Research and Statistics, Tennessee State Government, 6/26/2007

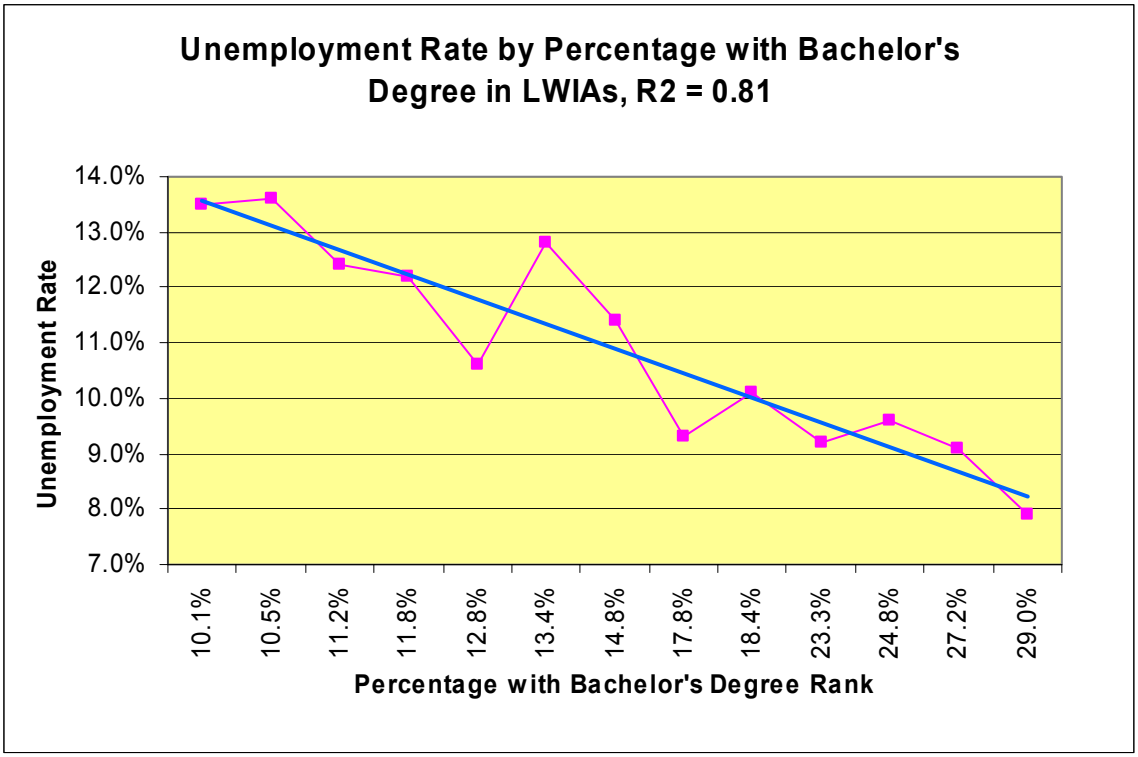

Figure 15. Unemployment Rate by Percentage with Bachelor's Degree in LWIAs

Workforce Area 7 (North Cumberland) shows one of the lesser increases in poverty from 2000 to 2004 (Table 17, page 43), although it continues to be relatively impoverished. Workforce Areas that tend to be leaders in educational attainment also tend to show the greatest growth in poverty from 2000 to 2004. Increasing differences between the more affluent and relatively deprived populations can be more accentuated in resource-rich localities. Lack of transportation, affordable housing, and housing discrimination in suburban and rural areas, as well as a lack of proximity to services, may worsen these differences. Data do show the inverse relationship between the average educational level of LWIAs and unemployment, so LWIAs with higher average educational levels generally may benefit residents living in them.

Education, Effort, and Income Rewards

Researchers in the state show the top 10 percent share of United States income at historic, pre-depression levels (Center for Business and Economic Research: 2007, 39). Accumulation of wealth in the upper 10 percent of the population (Center for Business and Economic Research: 2007, 41-42), indicating increasing inequality and lack of wage growth for the average worker, can discourage workers from job seeking. There are other negative effects of inequality, such as the relatively poor health status of the deprived population (Auerbach and Krimgold, 2001). Poor health has a feedback effect on

employment, with those in poor health having greater difficulty getting and keeping jobs and in maintaining the education and training necessary to contribute to the economy and their families.

Changes projected for 2008-2010, some of which have already occurred, show that employment of individuals with first professional degrees (doctors, lawyers, pharmacists) is projected to grow 5 percent per year (Table 18, page 46). Employment of individuals with PhD's, MA's, and AA's are expected to grow nearly three percent in the short term. Bachelor degreed persons will have a tougher job market, even somewhat more dim than for those with just some post secondary education. Those without degrees are expected to be the hardest hit, with employment declining from 1.3 to 2.2 percent per year.

Jobs requiring specialized training, such as AA degrees, post secondary (specialized), and advanced academic degrees (especially first professional degrees) are growing in today's market. Hardest hit are job seekers without degrees, from those with skills for short-term work to those with related work experience.

Blue-collar jobs in manufacturing, trade and transportation, and natural resources and mining are declining sharply at present (Table 8, page 27). These include many employees with high school education or job experience. The education and health services industries, showing strong growth, contain occupations employing those with first professional and MA degrees. Decline in the construction and manufacturing industries, should it be long-lived, is ominous for those without degrees.

Table 18. Changes in Employment from Projections for 2008 to 2010, and 2006 to 2016, by Educational Level

Educational Level	2008-2010 Annual Growth Rate	2006-2016 Annual Growth Rate	Percentage Difference of 2008-2010 over 2006-2016 Projection
1 Professional	5.0%	2.6%	2.4%
PhD	2.7%	1.6%	1.1%
MA	2.7%	1.9%	0.8%
BA + Work	-1.7%	0.7%	-2.4%
BA	-0.2%	1.6%	-1.8%
AA	2.9%	2.1%	0.8%
Post Secondary	0.3%	1.2%	-0.9%
Related Work Experience	-1.7%	0.9%	-2.6%
Long-term	-1.3%	1.0%	-2.3%
Moderate Term	-2.2%	1.0%	-3.2%
Short-term	-1.5%	1.1%	-2.6%

IV. Industries and Occupations in Local Workforce Investment Areas

Industries in LWIAs

Tennessee industries with high levels of employment include (a) trade, transportation, and utilities; (b) education and health services; and (c) manufacturing. Professional and business services as well as leisure and hospitality form a second level of business. LWIAs with a variety of industries are more likely to escape a downturn should it occur in just one or two industries. Reliance on one industry, when the economy goes sour, is not altogether advantageous.

Industrial employment varies within LWIAs, with trade, transportation, and utilities leading numerically (Table 19, page 47). Trade and transportation have significant percentages of employment across the state, with the most prominent proportions being in LWIA 13 (Memphis area).

Table 19. Industrial Distributions by Workforce Areas, Tennessee, 2006

LWIA	Industry Employees, excluding Self-Employed and Unpaid Family Workers	Natural Resources	Construction	Manufacturing	Trade, Transportation, Utilities	Information	Financial Activities	Professional and Business Services	Education and Health Services	Leisure and Hospitality	Other Services	Government
	100%	1%	5%	14%	22%	2%	5%	11%	19%	9%	4%	7%
1	6%	1%	6%	15%	17%	3%	4%	8%	21%	9%	5%	6%
2	6%	1%	4%	21%	19%	1%	4%	5%	16%	14%	3%	7%
3	8%	1%	5%	7%	21%	2%	5%	11%	21%	10%	4%	5%
4	6%	3%	5%	19%	16%	1%	4%	11%	18%	8%	3%	7%
5	10%	1%	4%	16%	20%	1%	6%	10%	16%	8%	5%	7%
6	3%	6%	3%	25%	16%	1%	3%	8%	17%	6%	3%	7%
7	3%	5%	4%	20%	18%	2%	3%	5%	21%	7%	3%	8%
8	8%	1%	6%	13%	18%	2%	6%	10%	18%	9%	5%	6%
9	21%	0%	4%	9%	20%	2%	5%	13%	18%	10%	4%	7%
10	3%	1%	3%	23%	17%	2%	4%	6%	20%	7%	4%	8%
11	5%	3%	4%	21%	17%	1%	3%	6%	22%	6%	4%	8%
12	3%	5%	4%	24%	17%	1%	3%	6%	17%	5%	4%	9%
13	19%	0%	4%	7%	27%	1%	5%	13%	17%	8%	4%	7%

First column shows the percentage in each LWIA comprising the state percentage of 100 percent.
Columns "Natural Resources" through "Government" give the percentages in each industry sector for that LWIA.
The sum of "Natural Resources" through "Government' total 100 percent, except for rounding.

Education and health services are a greater part of LWIA 11 (Jackson area), LWIA 1 (tri-cities), 7 (North Cumberland), and 3 (Knox). Trade and transportation as well as manufacturing provide alternate sources of livelihood.Unemployment runs high in LWIA 11, 1, 7, and 3 at 12.8, 9.3, 12.2, and 7.9 percent respectively (Table 13, page 38). LWIA 1 and 3 have lower unemployment rates than the state and higher education and health services employment.

Manufacturing includes about 14 percent of the statewide workforce—an industry continuing to decline. The epicenters of manufacturing include LWIAs 6 (Elk River), 10 (Duck River), and 12 (Reelfoot), where manufacturing includes about 25 percent of their LWIA workforce. Unemployment is high in these areas, running at 10.6, 13.6, and 13.5 percent in LWIA 6, 10, and 12, respectively (Table 13, page 38). All of these were greater than the Tennessee employment of 10.3 percent in May 2009.

Leisure and hospitality includes arts, entertainment, and recreation as well as accommodation and food services. LWIAs leading these industries include LWIAs 2 (National Park), 3 (Knox), and 9 (Davidson County) area.

Occupational Sectors in LWIAs

The largest occupational group in Tennessee is office occupations (SOC 43) (Table 20, page 50). These occupations are found primarily in the urban areas of LWIAs 9 (Davidson) and 13 (Shelby). Production occupations are most prominent in LWIAs 9 (Davidson), 5 (Hamilton), and 13 (Shelby), while sales occupations are more prevalent in LWIAs 13 (Shelby) and 9 (Davidson).

Life and Physical Sciences and architects and engineers are predominately located in LWIA 4 (High Tech) and LWIA 9. Farming also occurs in LWIA 4, accentuating the technology/ horticulture divide in that LWIA. A high percentage of legal occupations employment is found in LWIA 5 (Hamilton), where installation, production, and transportation occupations are numerous. LWIA 5 is located in the nexus of transportation advantages where a mountain area is punctuated by passes, divides, and river channels. The Shelby and Davidson areas (9 and 13) have a majority of the legal employment.

Farming is noticeably strong in LWIA 6 (Elk River) and the North Cumberland LWIA (7). Land between Lakes (LWIA 8) extends north and west of Nashville to the river borders of Kentucky and is significant in having balanced industry distribution, but is characterized by high employment in education and training, business, computer and math, life and physical sciences, and construction occupations. No LWIA seems better poised for growth than LWIA 8. LWIA 9 (Davidson), the leader in numbers of jobs, shows significant employment across most occupational sectors.

The LWIA encompassing the Duck River (10) contains an even distribution of most occupations, and so does LWIA 11 (Jackson). Jackson, however, contains more employees than does LWIA 10. LWIA 12 (Reelfoot) is primarily a farming region. Its occupations are lower in number but they appear to be well-distributed across the occupational categories.

In Shelby and Fayette Counties, comprising LWIA 13, protective service occupations are in greater representation, as well as transportation, computer/math, healthcare support, and legal occupations. Personal care and sales are strong.

Growth of Industry Sectors in LWIAs

LWIA 08 is projected to grow 30 percent for 2006-2016, the highest growth rate (Table 21, page 50). It is located from Williamson County northwest to the Kentucky border. LWIA 08 is fairly well distributed across industry sectors which is an advantage in challenging economic circumstances. Education and health services, financial activities, leisure and hospitality, and government show marked increases through 2016 in LWIA 8. Professional and business services, other services, natural resources, and manufacturing are likely to grow in the 2006-2016 decade.

Table 20. Percentage of Occupations across LWIAs, Tennessee, 2006

Percentage of Occupations across LWIAs, Tennessee, 2006														
		Percentage of Occupation in LWIA												
SOC/Title	Pct In TN	1	2	3	4	5	6	7	8	9	10	11	12	13
All Occupations	100%	6%	6%	8%	6%	10%	3%	3%	8%	21%	3%	5%	3%	19%
11 Management	6%	5%	5%	9%	6%	11%	3%	3%	9%	23%	2%	5%	2%	19%
13 Business/Financial	3%	4%	3%	8%	5%	11%	2%	1%	8%	26%	2%	3%	1%	26%
15 Computer/Math	1%	3%	2%	11%	5%	10%	1%	1%	7%	29%	2%	2%	1%	26%
17 Architec/Engineer	1%	5%	3%	7%	15%	9%	4%	2%	7%	26%	2%	3%	1%	15%
19 Life, Physical	0%	7%	3%	9%	13%	10%	0%	2%	7%	25%	2%	4%	1%	16%
21 Community/Social	2%	7%	5%	10%	5%	12%	3%	2%	7%	21%	3%	6%	3%	16%
23 Legal	0%	3%	3%	12%	2%	15%	0%	2%	4%	28%	2%	4%	1%	25%
25 Education/Training	5%	6%	6%	8%	7%	8%	4%	4%	10%	17%	3%	7%	3%	18%
27 Arts/Design	1%	5%	4%	10%	3%	10%	2%	1%	9%	33%	1%	4%	1%	16%
29 Healthcare Practice	5%	7%	4%	10%	5%	8%	2%	3%	7%	24%	3%	6%	2%	20%
31 Healthcare Support	2%	7%	6%	9%	6%	9%	3%	3%	8%	17%	3%	7%	2%	20%
33 Protective Service	2%	6%	4%	7%	5%	8%	3%	2%	5%	19%	3%	5%	5%	28%
35 Food Preparation	8%	6%	6%	10%	6%	10%	2%	2%	8%	22%	3%	4%	2%	18%
37 Building Grounds	4%	5%	6%	10%	7%	10%	2%	2%	8%	21%	3%	4%	2%	19%
39 Personal Care	2%	7%	5%	9%	5%	9%	2%	2%	11%	19%	2%	5%	2%	22%
41 Sales	10%	5%	6%	9%	5%	10%	2%	2%	9%	20%	2%	5%	2%	20%
43 Office	16%	5%	5%	9%	6%	10%	2%	2%	9%	22%	2%	4%	2%	21%
45 Farming	1%	3%	3%	4%	14%	6%	16%	11%	7%	5%	2%	9%	13%	7%
47 Construct/Extract	5%	6%	6%	10%	7%	10%	3%	2%	10%	20%	2%	4%	3%	16%
49 Install/Maintain	4%	7%	5%	8%	6%	11%	3%	3%	8%	21%	2%	6%	3%	17%
51 Production	11%	6%	9%	4%	7%	12%	6%	4%	8%	16%	5%	7%	5%	12%
53 Transportation	9%	4%	5%	6%	6%	13%	3%	3%	6%	19%	3%	5%	2%	25%
Second column shows the distribution of occupation in the state. Management occupations through transportation occupations equal 100 percent, except for rounding effects.														
Last 13 columns show the percentage of the occupation within each LWIA. Total for 13 columns in the row comprise 100 percent, except for rounding effects.														

For the entire state, education and health services, natural resources mining, manufacturing, and leisure and hospitality are expected to have stronger growth rates through 2016. Trade, transportation, and utilities are expected to decline, and this is no doubt an artifact of the decline of this sector in the last few years

Table 21. Projected 10 Year Growth Rates for Industry Sectors in LWIAs, Tennessee, 2006-2016

LWIA	Industry Employees, excluding Self-Employed and Unpaid Family Workers	Natural Resources	Construction	Manufacturing	Trade, Transportation, Utilities	Information	Financial Activities	Professional and Business Services	Education and Health Services	Leisure and Hospitality	Other Services	Government
	12%	12%	10%	21%	-6%	11%	2%	12%	22%	21%	16%	9%
1	12%	12%	-7%	12%	-12%	7%	43%	13%	10%	27%	21%	6%
2	14%	14%	61%	31%	-4%	20%	18%	4%	16%	12%	12%	35%
3	13%	13%	-6%	15%	-8%	15%	-8%	17%	16%	14%	24%	17%
4	16%	15%	19%	28%	-3%	17%	17%	16%	15%	20%	37%	22%
5	10%	10%	-21%	6%	-5%	11%	1%	19%	15%	23%	12%	7%
6	11%	11%	8%	20%	-5%	7%	45%	11%	26%	22%	20%	13%
7	8%	8%	21%	23%	-15%	9%	24%	13%	24%	13%	13%	12%
8	30%	30%	2%	27%	-7%	24%	55%	35%	58%	43%	30%	42%
9	12%	12%	24%	27%	-5%	16%	-20%	4%	15%	22%	11%	7%
10	4%	4%	21%	27%	-19%	2%	18%	11%	17%	23%	7%	-7%
11	11%	11%	3%	27%	1%	7%	17%	13%	15%	23%	4%	0%
12	9%	9%	-9%	17%	-7%	5%	53%	8%	53%	17%	24%	8%
13	8%	7%	23%	18%	-2%	3%	-25%	1%	24%	15%	10%	-11%

Natural resources and mining are expected to grow in LWIA 08. Construction shows very strong growth in LWIA 02 (National Park). Manufacturing may grow strongly in LWIA 04 (High Tech), and LWIA 08, 09, 10, and 11, perhaps reflecting the influence of alternate sources of energy. Financial activities may grow strongly in LWIA 08, 12, 06, and 01. Education and health services may grow strongly in LWIA 08 and 12. Leisure is likely to grow in LWIA 01, 05, 10, 11, and 06. Other services are projected to grow in LWIA 04 and 08. Government is shown to have high growth in LWIA 02.

Growth of Occupational Sectors in the LWIAs

Occupation growth among occupational sectors is nested within the wider context of industrial and occupational change within the state through 2016. Some LWIAs are slowing down in growth rates for various occupations, while others are speeding up, in the context of what is happening statewide.

Occupational growth occurs within industries, so changes in industrial employment are relevant to occupational growth rates. Growth is projected to occur in the industry sectors professional and business services (2.0 percent per year, Table 7, page 27), education and health services (1.9 percent), construction (1.9 percent), and leisure and hospitality (1.5 percent). Manufacturing employment is likely to decrease through 2016.

The most rapidly growing occupational group is legal occupations with a 1.2 percent annual growth rate for 2006-2016 (Table 22, page 53). The education and healthcare sectors are also leading in growth, including the healthcare support occupations, healthcare practitioners and technical occupations, community and social services, personal care and service, and also education, training, and library occupations. Computer and mathematical occupations are expected to grow rapidly, as are business and financial operations. Protective service, construction and extraction, and food preparation and serving related occupations are also among the most rapid growth sectors.

Management occupations are anticipated to grow strongly in LWIAs in LWIA 09, in the Davidson County area (Table 22, page 53). Business and financial growth is likely in LWIA 13 (Fayette and Shelby Counties). Computer and mathematical occupations are likely to show growth through 2016 in LWIAs 09, 10 (Duck River), and 01 (tri-cities). Life and physical sciences show strong growth in LWIA 09 and LWIA 05 (Hamilton County area).

Community and social occupations show strong growth in LWIA 11 (Jackson area) and 09. Legal services show their strongest growth in LWIA 08. Arts and Design as well as healthcare practice and healthcare support are strongest in LWIA 09. Other strong employment growth from the protective service (NAICS 33) through transportation sectors (NAICS 53) is shown in the table.

Table 22. Projections of Major Groups of Occupations, Tennessee, 2006 through 2016

SOC	Title	2006 Estimate	2016 Projection	Job Growth	Growth Rate
00-0000	Total, All Occupations	3,007,840	3,378,980	371,150	1.2%
23-0000	Legal Occupations	13,870	17,680	3,810	2.5%
31-0000	Healthcare Support Occupations	69,000	87,310	18,310	2.4%
29-0000	Healthcare Practitioners and Technical Occupations	157,370	194,740	37,370	2.2%
21-0000	Community and Social Services Occupations	47,470	58,030	10,570	2.0%
33-0000	Protective Service Occupations	59,670	72,090	12,430	1.9%
15-0000	Computer and Mathematical Occupations	39,860	47,860	8,000	1.8%
25-0000	Education, Training, and Library Occupations	156,880	187,370	30,490	1.8%
47-0000	Construction and Extraction Occupations	138,440	163,320	24,880	1.7%
13-0000	Business and Financial Operations Occupations	89,620	105,150	15,530	1.6%
35-0000	Food Preparation and Serving Related Occupations	235,140	275,500	40,360	1.6%
39-0000	Personal Care and Service Occupations	75,350	87,680	12,340	1.5%
49-0000	Installation, Maintenance, and Repair Occupations	128,320	144,630	16,310	1.2%
37-0000	Building and Grounds Cleaning and Maintenance Occupations	111,210	123,720	12,510	1.1%
41-0000	Sales and Related Occupations	294,420	326,920	32,490	1.1%
45-0000	Farming, Fishing, and Forestry Occupations	24,780	27,710	2,940	1.1%
43-0000	Office and Administrative Support Occupations	478,680	530,100	51,420	1.0%
11-0000	Management Occupations	188,160	205,830	17,670	0.9%
19-0000	Life, Physical, and Social Science Occupations	14,750	15,890	1,150	0.8%
17-0000	Architecture and Engineering Occupations	36,340	38,480	2,140	0.6%
53-0000	Transportation and Material Moving Occupations	276,870	294,960	18,100	0.6%
27-0000	Arts, Design, Entertainment, Sports, and Media Occupations	43,810	45,770	1,960	0.4%
51-0000	Production Occupations	327,860	328,250	380	0.0%

Source: Tennessee Department of Labor and Workforce Development
Employment Security Division, Research and Statistics Section, 7/11/2008

Table 23. 10 Year Change Rates of Employment in Occupational Groups within LWIAs, Tennessee 2006-2016

	10 Year Change in Employment of Occupation in LWIA												
SOC/Title	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
All Occupations	12%	14%	13%	15%	10%	11%	8%	30%	12%	4%	11%	9%	7%
11 Management	9%	6%	11%	11%	14%	7%	11%	11%	28%	10%	1%	6%	10%
13 Business/Financial	16%	14%	8%	17%	13%	15%	6%	11%	40%	15%	-1%	11%	25%
15 Computer/Math	20%	1%	14%	13%	-1%	18%	26%	8%	54%	23%	-7%	14%	-4%
17 Architec/Engineer	6%	-18%	11%	-3%	-14%	23%	4%	4%	36%	6%	-19%	7%	11%
19 Life, Physical	7%	-5%	31%	10%	-27%	9%		10%	73%	20%	12%	-2%	0%
21 Community/Social	22%	26%	25%	15%	25%	12%	27%	10%	31%	18%	34%	24%	16%
23 Legal	26%	4%	-16%	33%	46%	17%		15%	32%	50%	8%	-5%	-25%
25 Education/Training	20%	12%	5%	11%	17%	20%	22%	10%	25%	39%	18%	17%	9%
27 Arts/Design	4%	20%	19%	4%	11%	19%	11%	21%	26%	-13%	14%	3%	15%
29 Healthcare Pract	23%	30%	25%	22%	28%	26%	20%	20%	55%	9%	24%	27%	16%
31 Healthcare Support	26%	48%	20%	24%	22%	27%	28%	23%	64%	17%	13%	29%	20%
33 Protective Service	21%	39%	36%	23%	22%	12%	30%	15%	21%	26%	14%	16%	8%
35 Food Preparation	17%	18%	6%	24%	37%	13%	21%	14%	33%	14%	7%	7%	21%
37 Building Grounds	11%	6%	15%	20%	16%	11%	6%	7%	43%	9%	5%	4%	9%
39 Personal Care	16%	20%	10%	17%	19%	25%	18%	25%	53%	10%	28%	24%	22%
41 Sales	11%	16%	13%	9%	14%	8%	3%	7%	32%	15%	2%	7%	3%
43 Office	11%	10%	14%	11%	12%	10%	7%	7%	35%	11%	5%	10%	1%
45 Farming	12%	-9%	65%	-3%	21%	-18%	7%	17%	3%	27%	16%	9%	-8%
47 Construct/Extract	18%	10%	38%	11%	12%	6%	14%	20%	26%	18%	16%	24%	19%
49 Install/Maintain	13%	4%	30%	18%	23%	7%	17%	12%	23%	13%	2%	8%	18%
51 Production	7%	1%	19%	6%	24%	3%	13%	6%	16%	3%	6%	2%	6%
53 Transportation	9%	6%	11%	11%	14%	7%	11%	11%	28%	10%	1%	6%	10%

V. Wages in Tennessee since 2002

The employment cost index, wages, and benefits (primarily benefits) show decreasing growth during the years since 2006 (Figure 16, page 56). Wages since 2002 in industries reported by the Quarterly Census of Employment and Wages (QCEW) show a 2.9 percent annual increase (Table 24, page 57). These are for years from quarter 4 2004 through quarter 3 2006, with each 4 quarters constituting the year. Average wages increased from roughly $33,000 in 2002 to $37,000 in 2006. Slowdown cycles, of course, affect the precision and meaning of these figures, but they do give a general picture of change during this period.

Greatest percentage gains for this period are in management (7.8 percent per year increase), mining (5.4 percent), real estate (4.3 percent), arts, entertainment, and recreation (4.3 percent), and Agriculture, Forestry, Fishing & Hunting. Slowing increases in wages include those in other services (1.6 percent), accommodation and food services (1.8 percent), utilities (2.0 percent), and retail trade (2.1 percent).

Although wages have increased during the last few years, growth is uneven across industries, with lower paid workers falling further behind. Industries of higher average wages increased their advantage, generally. Finance and insurance as well as utilities grew at a rate below average, although their wages are historically higher. Mining wages showed strength. Relatively low-paid service industries, including other services, accommodation and food services, and retail showed weaker than average wage growth. Changes in wages reflect, in part, differences in educational levels of workers. Other factors, such as leverage to gain advantageous salaries, may also be at work. Differences in wages are partly a result of less than vigorous overall economic growth.

More recent data show that average hourly manufacturing wages have actually decreased for months during the years 2007 and 2008 (Figure 17, page 58). Wages fell for most of 2008--from March 2008 through July 2008, and from September 2008 until November 2008. The 12 month moving average of wages fell in January and February 2008 and during February and March 2009. Recent data from the Bureaus of Labor Statistics shows some decline in wages in industries during 2008 and 2009. These include primarily the goods-producing industries in 2008, but loses were seen in the private service-providing industries during 2009 (Table 25, page 59). Trade, transportation, and utilities as well as other services have so far sustained the most pronounced wage losses in 2009.

Occupational wages (Table 26, page 60) show greater than average increases from May 2003 to May 2007 in community and social services occupations; healthcare practitioners and technical occupations; architecture and engineering occupations; farming, fishing, and forestry occupations; and management occupations—all above 3.9 percent increase per year during 2003 to 2007. Slower rates of wage growth (ranked from lower growth to higher) include construction and extraction occupations; production occupations;

installation, maintenance, and repair occupations; life, physical, and social science occupations; transportation and material moving occupations; business and financial operations occupations; and sales and related occupations—all at 2.2 percent or less per year growth in average wages.

Factors influencing increases in occupational wages include needs of the culture, with increased wages promoting hiring in the areas of social services, healthcare, community and infrastructure maintenance and improvements, farming, and management. Decreased wages in the construction, production, and installation and repair may reflect increased competition in their industries. Computer and mathematical occupations continue to receive high wages, but these occupations are now in a more stable period.

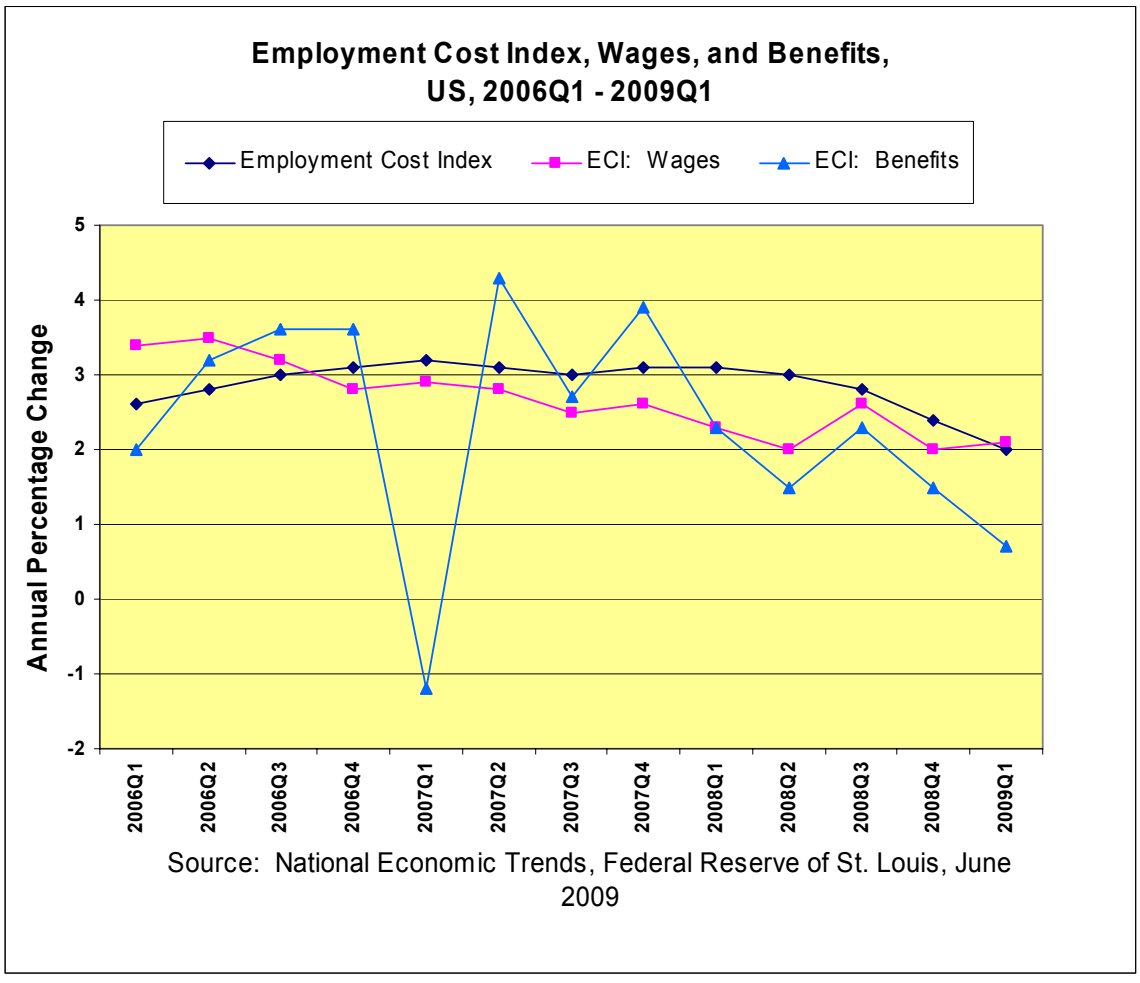

Figure 16. Employment Cost Index, Wages, and Benefits

Table 24. Year-over-Year Year (YOY) Wage and Wage Growth in Tennessee for Major Industry Groups, from 2002 Quarter 4 to 2006 Quarter 3, Quarterly Census of Employment and Wages (QCEW), by 2006 Wage Growth

Industry Group	YOY 2002 Wage	YOY 2006 Wage	Annual Growth Rate
Management of Companies and Enterprises	$49,900	$67,400	7.80%
Mining	$44,600	$55,100	5.40%
Real Estate and Rental and Leasing	$30,800	$36,400	4.30%
Arts, Entertainment, and Recreation	$29,600	$35,000	4.30%
Agriculture, Forestry, Fishing & Hunting	$21,800	$25,700	4.30%
Wholesale Trade	$44,300	$51,500	3.80%
Professional and Technical Services	$47,400	$54,000	3.30%
Health Care and Social Assistance	$34,800	$39,700	3.30%
Information	$41,100	$46,200	3.00%
Construction	$34,200	$38,500	3.00%
Manufacturing	$39,500	$44,300	2.90%
Finance and Insurance	$52,300	$58,200	2.70%
Administrative and Waste Services	$24,000	$26,600	2.70%
Transportation and Warehousing	$39,500	$43,700	2.50%
Public Administration	$34,200	$37,600	2.40%
Educational Services	$31,600	$34,700	2.40%
Retail Trade	$22,800	$24,800	2.10%
Utilities	$51,500	$55,800	2.00%
Accommodation and Food Services	$13,400	$14,400	1.80%
Other Services, Ex. Public Admin	$23,900	$25,400	1.60%
Total, All Employees	$33,000	$37,000	2.9%
CPI Change	181.2	203.4	2.6%

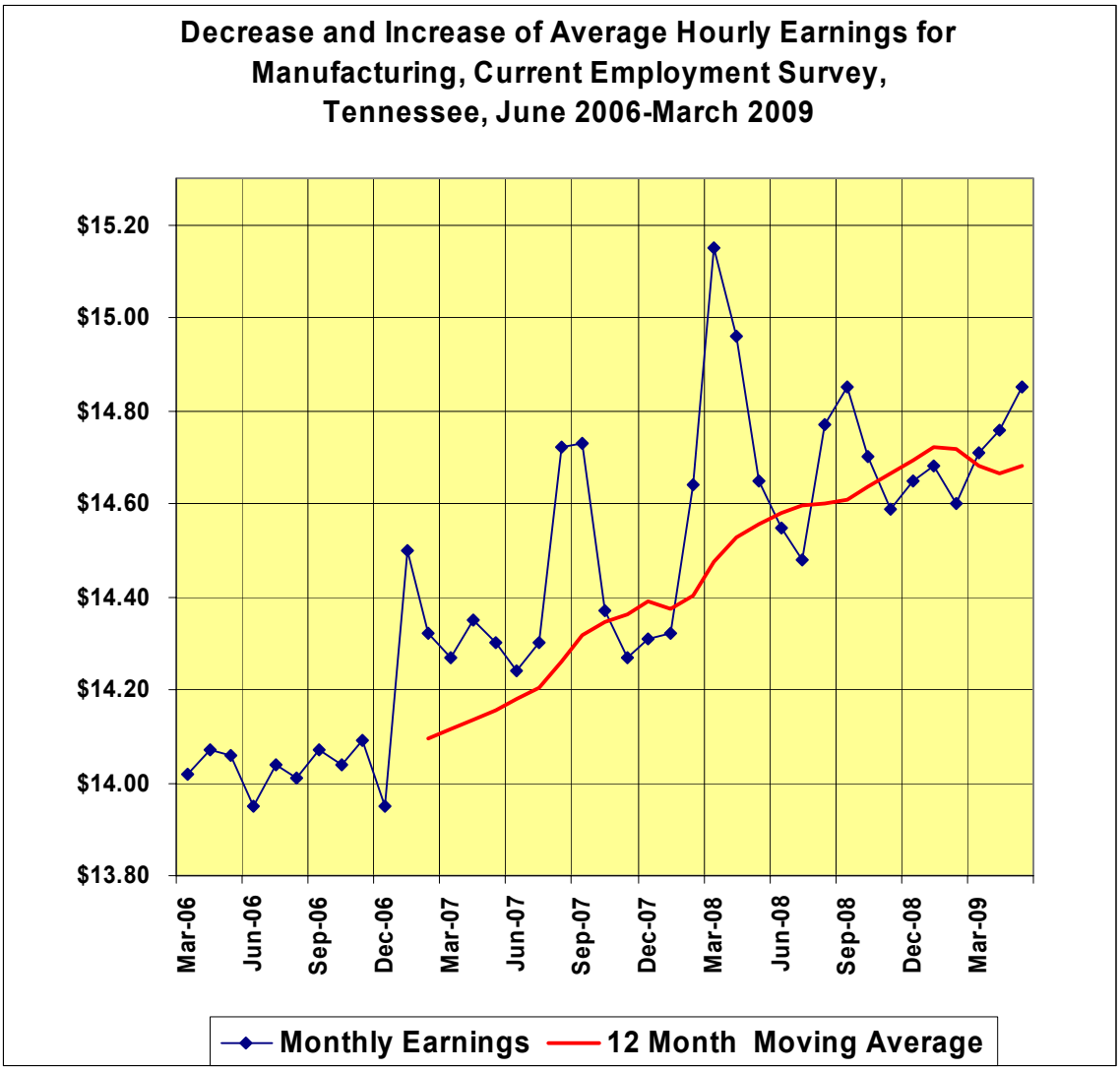

Figure 17. Decrease and Increase of Average Hourly Earnings for Manufacturing, Current Employment Survey, Tennessee, June 2006-March 2009

Table 25. Decline and Increase in Wages for Industries in Tennessee, 2007-2009, CES

Industry	Annual Pct Gain in 2007	Annual Pct Gain in 2008	Annualized Gain in 2009
Total Private	1.9%	0.3%	0.1%
Goods Producing	2.9%	-0.8%	11.4%
Private Service Providing	1.7%	0.7%	-2.8%
Mining, Logging, and Construction	3.8%	2.7%	3.7%
Manufacturing	2.8%	-1.9%	12.3%
Trade, Transportation, and Utilities	0.6%	5.6%	-5.8%
Information	4.0%	8.3%	2.6%
Financial Activities	0.0%	1.1%	-1.2%
Professional and Business Services	6.8%	-6.3%	-1.1%
Education and Health Services	-3.1%	-0.2%	3.7%
Leisure and Hospitality	2.2%	2.6%	1.7%
Other Services	-1.2%	-2.9%	-6.0%

http://www.bls.gov/sae/experimental/sae47.htm#tab3

Table 26. Growth in Average Annual Wages in Tennessee for Major Occupational Groups, May 2003 to May 2007

		Average Annual Wage		
		May 2003	May 2007	Annual Growth Rate
00-0000	All Occupations	$31,910	$35,380	2.6%
	CPI Change	183.5	207.9	3.0%
21-0000	Community and social services occupations	$29,140	$34,540	4.3%
29-0000	Healthcare practitioners and technical occupations	$48,590	$57,580	4.3%
17-0000	Architecture and engineering occupations	$53,490	$63,080	4.2%
45-0000	Farming, fishing, and forestry occupations	$21,400	$25,090	4.1%
11-0000	Management occupations	$66,440	$77,370	3.9%
23-0000	Legal occupations	$67,940	$77,900	3.5%
27-0000	Arts, design, entertainment, sports, and media occupations	$35,500	$40,580	3.4%
31-0000	Healthcare support occupations	$21,210	$23,900	3.0%
37-0000	Building and grounds cleaning and maintenance occupations	$18,570	$20,910	3.0%
43-0000	Office and administrative support occupations	$25,720	$28,960	3.0%
25-0000	Education, training, and library occupations	$35,340	$39,510	2.8%
33-0000	Protective service occupations	$27,440	$30,280	2.5%
15-0000	Computer and mathematical occupations	$54,410	$60,040	2.5%
39-0000	Personal care and service occupations	$20,180	$22,210	2.4%
35-0000	Food preparation and serving related occupations	$15,820	$17,370	2.4%
41-0000	Sales and related occupations	$28,400	$30,940	2.2%
13-0000	Business and financial operations occupations	$51,420	$55,980	2.1%
53-0000	Transportation and material moving occupations	$26,630	$28,900	2.1%
19-0000	Life, physical, and social science occupations	$50,170	$54,390	2.0%
49-0000	Installation, maintenance, and repair occupations	$33,970	$36,660	1.9%
51-0000	Production occupations	$27,500	$29,300	1.6%
47-0000	Construction and extraction occupations	$30,750	$32,620	1.5%

Source: Occupational Employment Statistics; http://www.bls.gov/oes/oes_dl.htm

VI. Emerging Industries and Economic and Workforce Development

Tennessee is the envy of most states in its recent success in landing a wide array of emerging technology projects relating to energy independence. These include Hemlock Semiconductor in Clarksville; Wacker Chemie AG in Cleveland; the planned Volunteer State Solar Initiative for Jackson and Oak Ridge; the Volkwagen high fuel efficiency diesel car plant in Chattanooga; the Nissan lithium ion battery production facility and electric car production; and eTec, providing electric charging stations. These investments represent billions of dollars of investment in renewable energy and energy efficient transportation and tens of thousands of potential jobs (Table 27, p.62).

Tennessee is also poised to lead the way in alternative fuels production, with the approval of funding for a proposed $40 million ethanol plant in East Tennessee and a $125 million grant from the United States Department of Energy for a bioenergy center at the Oak Ridge National Laboratory. The ethanol initiative, involving Genera Energy, the University of Tennessee Biofuels Initiative and DuPont Danisco Cellulosic Ethanol, LLC., is to produce ethanol fuel from switchgrass and other forest and agricultural biomass. The initiative is planned with a refinery in Vonore; with 4,000 jobs expected to be created, along with $100 million annually in new farm revenue and 1 billion gallons of Grassoline annually (Tennessee State Government, 2009). Research is under way on the feasibility of developing cellulosic-based fuels from plants such as switchgrass or the tulip poplar (Owenby, 2007). Jobs related to alternative fuels production would include farmers and/or foresters needed to grow and harvest crops, refining and distribution jobs, and agricultural scientists to develop new types of fuel and refining processes.

The above initiatives will complement existing renewable energy component production in Tennessee, including Sharp Solar (solar panels); AFG Industries (flat glass); Aerisyn (wind turbines); and Thomas and Betts (wind components). In addition, the U.S. Department of Energy has to date identified the following Recovery Act spending allocated to Tennessee: Weatherization, $99 million; Energy Efficiency and Block Grant Program, $42 million; Science, $71 million; Environmental Management, $755 million (for environmental cleanup at Oak Ridge); and $7 million for biomass (U.S. Department of Energy, 2009).

The Tennessee Valley Authority (TVA) is offering incentives in Nashville and for Middle Tennessee Electric Membership Corporation customers for residential home efficiency energy improvements, including home energy evaluations, cash back on efficiency improvements that can be augmented with federal tax credits, and low interest loans. The State passed the Tennessee Clean Energy Future Act of 2009 (SB 2300; Public Chapter No. 529) to enhance the state building energy management program; have a goal that 100% of passenger cars newly purchased by the state be energy efficient; to require the state to purchase Energy Star rated appliances; and to promote residential building codes that can improve energy efficiency.

Table 27. New Green Jobs Investments in Tennessee, 2009

Company	Product	Announced Investment	Expected Number of Jobs
Hemlock Semiconductor (Clarksville)[1]	Polycrystalline silicon which can be used in solar panels	$1.2- $2.5 billion (depending on the market)	500-900 [1,000 construction and related starting in 2009]
Wacker Chemie AG (Cleveland)[2]	Polycrystalline silicon	$1 billion	500-600
Volunteer State Solar Initiative (includes a 5 MW solar generation facility near Brownsville and a solar research institute in Oak Ridge)(planned)[3]	Electricity from solar photovoltaic process	$62 million	Not known
Volkswagen (Chattanooga)[4]	High fuel efficiency diesel cars	$1 billion;[of this, $436 million in construction contracts in 2009]	2,000 [additional 9,500 indirect jobs]
Nissan (Smyrna)[5]	Zero emissions electric cars; Lithium ion batteries	$1.6 billion	1,300 in auto manufacturing
eTec[6]	Electric car charging stations	$199.6 million	750 [by 2012]

Sources:
(1) Northeast Tennessee Valley Regional Industrial Development Association. "Tennessee lands Hemlock Semiconductor in Clarksville, Tennessee." December, 2008. http://www.netvaly.org/pages/newspages/hemlock.htm.
(2) Phil Bredesen. "We should seize this opportunity." Editor: "Bredesen sees solar institute." Tennessean. March 1, 2009, p. 18A.
(3) Press Release. "Bredesen proposes Volunteer State Solar Initiative." May 13, 2009. http://news.tennesseeanytime.org/node/1870.
(4) "Tennessee: Clean jobs. Bright future. Green vehicles." www.tnecd.gov
(5) Blake Farmer. "Nissan will bring electric cars to Smyrna." Nashville Public Radio. June 23, 2009. http://wpln.org.?p=8918.
(6) Associated Press. "Electric car chargers to come early to Nashville." Tennessean. August 6, 2009, p. 1A.

The Tennessee Valley Authority, through the Green Power Switch program (www.greenpowerswitch.com), has added to its hydroelectric generation the capacity for wind and solar energy generation. This is partially financed through consumer check-off on electricity bills. In addition, consumers who generate their own power through alternative means can sell excess power back to TVA through the grid.

As described in Tennessee's report **Growing Green: the Potential for Green Job Growth in Tennessee,** the primary energy efficiency and renewable energy (EE/RE) sectors for Tennessee include green building/retrofitting, biofuels, wind energy (including component manufacture), solar energy (including component manufacture), and geothermal (http://www.state.tn.us/labor-wfd/Publications/EmploymentSecurity/GrowingGreenInTN2008.pdf**).**

Geothermal, while not as well known as other renewable energy sources, can produce significant savings for residential and government or industrial consumers. Homeowners can save 20 to 50 percent in the cooling mode, and more in heating. Geothermal energy involves using the earth's heat and/or the differences in temperature between the earth and other media to produce heat or electricity. According to the National Renewable Energy Laboratory, electricity produced through geothermal means could meet 4 to 20 percent of current U.S. electricity needs.

TVA has been actively working with local school districts to implement geothermal energy projects in elementary and secondary schools that are being constructed or renovated. The Sumner County School system has 10 buildings with geothermal installed; Cheatham, Clay, and Overton County also have systems installed. Geothermal is also being used in the Executive Residence and in at least one classroom building at David Lipscomb University. Geothermal or ground source heat pumps emit no pollutants on site and with few moving parts, can be maintenance free for 20 years or more.

The initial analysis done in **Growing Green** identified 162 occupations (tables 5 to 9) expected to be prominent in the five sectors identified above. These are occupations already in the workforce which would utilize existing skills or learn new skills to work in the RE/EE industries. Some of the occupations include:

Green Building/Retrofitting: Financial managers; construction managers; cost estimators (including energy auditors); sales representatives; architects; drafters; brickmasons and blockmasons; carpenters; electricians; insulation workers; construction laborers; heating, air conditioning and refrigeration mechanics; and truck drivers.

Biofuels: Farm managers; farmers and farm workers; wholesale and retail buyers; chemical and industrial engineers; chemists; agricultural equipment operators; industrial machinery mechanics; chemical equipment operators and tenders

Solar Energy (including component manufacture): Industrial and mechanical engineers; electricians; plumbers, pipefitters, and steamfitters; computer-controlled machine tool

operators; team assemblers; heat treating equipment setters and operators, metal and plastic; chemical plant and system operators

Wind Energy (including component manufacture): Environmental and mechanical engineers; sales representatives; electricians; millwrights; welders; machinists; operating engineers and other construction equipment operators; production, planning, and expediting clerks

Geothermal: Construction managers; cost estimators; customer service representatives; heating, air conditioning, and refrigeration mechanics and installers; pipelayers; plumbers, pipefitters, and steamfitters and their helpers; civil engineering technicians; operating engineers.

The Hemlock Semiconductor Corporation, which will make polycrystalline silicon, a component of solar panels and other products, has listed some of the key occupations for which they will be recruiting in 2011. Some of these job titles (converted to Standard Occupational Codes (SOC)) include:

- Chemical, electrical, and mechanical engineers;
- Accountants, production planning clerks, and other office staff
- Chemical plant and system operators
- Electricians, pipefitters, and millwrights
- Numerical tool and process control programmers

They will require silver and gold level national career readiness certificates.

Another key area related to energy efficiency in Tennessee is transportation. Nissan will be producing an electric car; eTec electric car charging stations; and Volkwagen high fuel efficiency diesel automobiles. Volkswagen has begun recruitment in Tennessee. Some of the positions for which they have begun recruitment include (converted to SOC titles):

- Electrical and Electronic Equipment Assemblers
- Team Assemblers
- Industrial Engineering Technicians
- Industrial Engineers
- Electrical Engineering Technicians

Their web site is http://www.identifythebest.com/VolkswagenWS/home.asp

Training Related to Green Jobs

The Tennessee Board of Regents completed a study in June 2009 of the programs and majors at the state colleges and universities relating to the five green jobs sectors and potential green occupations identified in Tennessee's **Growing Green** report. The institutions were asked to list the degree (s) related to the occupation and the major or concentration, and whether the program is focused on the clean energy occupations listed.

The Board of Regents summarized the results of their training survey for each of the five sectors- green building, biofuels, wind energy, solar energy, and geothermal. The study can be found at http://www.sourcetn.org/admin/gsipub/htmlarea/uploads/TBRGreenJobTrainingSurvey.htm.

- Green Building – Of the 40 occupations listed in the **Growing Green** report, community colleges said they were providing skill sets in programs related to all but seven of the occupations. The seven areas can be taught in short-term courses. The universities have courses with related skill sets for 21 of the 40 occupations.

  For example: Construction Managers: The Associate of Applied Science (A.A.S.) degree is offered at Chattanooga State Technical Community College; CISCC; Northeast State Community College; and Pellissippi State Community College.

- Biofuels – The universities reported they provide skill set degree programs in 23 of the 33 occupations listed, with agriculture- related majors highlighted and a Ph.D. program in the occupational skill sets for chemists and chemical engineers. the community colleges reported programs teaching skill sets for all but two of the occupations, from technical certificate levels to two-year associate degrees.
- Wind energy and components – Fourteen occupations had related university programs; the community colleges reported teaching skill sets for all but two of the 33 occupations listed. For the latter, the predominant degree offered is Associate of Applied Science.
- Solar energy and components – The universities had programs to teach skill sets related to seven of the 31 occupations within the solar sector, primarily in business, science and engineering. Austin Peay State University has eight additional occupations' skill sets taught at the associate level. Again, the community colleges had courses relating to skill sets in most occupations.
- Geothermal energy- Skill sets for 17 of the 31 occupations in this sector are being taught at the universities; community colleges teach skill sets related to all occupations except pipelayers.

The Tennessee Technology Centers (TTCs) are actively adding course content relating to newly developing skill requirements in the "greening economy." In a recent communication to the department's Employment and Training Division, Chelle Travis, the Assistant Vice Chancellor for Instruction for the Tennessee Technology Centers at the Board of Regents summarized these advances:

> *"Earlier this year, the Tennessee Technology Centers formed a state-wide green curriculum committee…Currently the Tennessee Technology Centers, have integrated geothermal, solar photovoltaic and heat systems, other electrical production and consumption methods, comfort heating and cooling methods and green alternatives, fuel cell technology, heat pump technology, alternative fuels,*

water reuse systems, high efficiency plumbing fixtures, hot water distribution systems, hot water circulating systems, potable water conservation, and many other methods of improving energy efficiency into our programs.

In addition, we have developed a state-wide hybrid (online and on-ground instruction) weatherization program which will be used as a stand-alone program to train installers, crew chiefs, and energy auditors. This program will also be integrated into the curriculum of many of our Building Trades programs. Our automotive programs will be adding curriculum related to hybrid and electric cars. Due to regional differences, some TTCs will have programs that are tailored to the needs of business and industry in their area and therefore programs may vary slightly." (Travis, 2009)

The Hemlock Semiconductor Corporation (inputs for solar panels) has identified its educational needs. These are increasing interest in math and science at the pre-college levels; working with graduates of the Austin Peay (APSU) Chemical Engineering Laboratories and Programs; dual enrollment of high school students at APSU; interns and co-op positions; and working with graduates of the skilled trades training at the local Tennessee Technology Center. For successful quality implementation of this new manufacturing technology in Clarksville, educational institutions at all levels have a role to play. Hiring is targeted to begin in late 2011.

Certifications and Training Related to Green Jobs

Federal stimulus money coming to Tennessee for energy efficiency and renewal energy has created the need for additional trained workers in the areas of energy rating, energy auditing, solar panel installation, retrofitting design and implementation, and energy services. Funding for weatherization alone is $99 million. A list of common certifications, certifying agencies, and their web sites are listed (Table 28, page 67)

At the secondary and post secondary level, there has been much interest in the certifications required for energy raters and auditors, as well as where this training can be obtained. The dispersal of funds for weatherization is through the Tennessee Department of Human Services to a variety of contractors. Some educational institutions are sponsoring training, along with TVA. Not all programs will lead to certification.

Table 28. List of Common Certifying Agencies in the Renewable Energy and Energy Efficiency Industries

Certifying Agency	Web Site	Certifications
North American Board of Energy Practitioners	http://www.nabcep.org/certification/the-need-for-certification	PV Installer Certification
		Solar Thermal Installer Certification
Association of Energy Engineers	http://www.aeecenter.org/certification/	Certified Energy Manager
		Certified Lighting Efficiency Professional
	(The following nine are available online only)	Certified Business Energy Professional
		Certified Building Commissioning Professional
		Certified Energy Auditor
		Certified Energy Procurement Professional
		Certified Measurement and Verification Professional
		Certified Power Quality Professional
		Certified Sustainable Development Professional
		Distributed Generation Certified Professional
		Certified Green Building Engineer
Building Performance Institute	www.bpi.org	Building Analyst, Envelope, and Heating
		HERS Rater Training
Energy Star/Residential Energy Services Network	http://www.resnet.us/rater/certified/default.htm	Certified Home Energy Rater (HERS=Home Energy Rating System)
Solar Energy International (SEI)	http://www.solarenergy.org/resources/faqs.html	Check with your local jurisdictions about all the certifications needed to install solar
Green Building Certification Institute	http://www.gbci.org/	LEED AP Building Design and Construction
		LEED AP Interior Design and Construction

Source: Web sites listed above.

A recent survey by the Tennessee Board of Regents identified several community colleges that are providing training related to energy auditing/weatherization. Cleveland State Community College offers a Home Energy Rating System (HERS) course as a semester course on contract with the Chattanooga Career Center. Completion of the course allows students to take the RESNET exam to become certified raters. Pellissippi State and Volunteer State also offer courses that lead to certification. Pellissippi State has rented space to TVA and the Conservation Services Group (CSG) to do one-week classes for Weatherization Assistance. These one-week classes are also being held in the Jackson area by TVA/CSG. Other colleges have some non-credit courses and/or are exploring options.

Example of Regional Economic and Workforce Development in Sustainable and Renewable Resources – the Biobased Products Strategy

The 98-county Mid-South Mississippi Delta Region is an area rich in biomass resources. With the need for environmental and strategic security reasons to reduce the use of fossil fuels and other activities employing fossil carbon resources, research has blossomed on the potential for the use of sustainable and renewable biobased products. Biomass can be divided into four categories: (1) oilseeds; (2) sugar and starches; (3) lignocellulosics; and (4) niche crops. From these crops, there is potential to produce a wide variety of products including biofuels and energy; green chemicals; biobased materials; and health and nutrition products.

An extensive collaboration network involving public, private, and nonprofit organizations has been formed to develop a regional economic and workforce strategy for biobased products. The 98 counties encompass parts of five states - Arkansas, Kentucky, Mississippi, Missouri, and Tennessee. Leading the effort are the Memphis Bioworks Foundation and personnel in the Arkansas Energy Office and Arkansas Economic Development Commission, the School of Agriculture at Murray State University in Kentucky, the Mississippi Technology Alliance, and the Southeast Missouri Economic Development Alliance.

In August the Battelle Memorial Institute Technology Partnership Practice released an extensive study describing a regional strategy for biobased products (Battelle, 2009). The steering committee providing oversight for the strategy included 23 members from academia, the private sector, and economic development organizations. Special recognition was given to the Tennessee Department of Agriculture and Memphis ED for their early support. Additional sponsors for the study included 19 corporate sponsors (including Genera Energy, LLC), and 29 non-profit and educational sponsors.

The study outlined several near- to mid- term bioprocessing strategies as the most viable for the region: co-firing biomass in regional coal-fired power plants and industry coal boilers; specialty oilseed crops and local crushing facilities; development of sweet sorghum-based ethanol production; and lignocellulosic–based ethanol and/or liquid fuel facilities. Assuming lignocellulose conversion to liquid fuels is commercially viable, the study predicts the creation of upwards of 25,000 jobs in the region (5,100 direct jobs in

biorefineries and processing plants, and over 20,000 indirect jobs in the supply chain including biomass production, transportation and other support sectors) in the next decade.

The benefits for rural areas such as West Tennessee, in business development and poverty reduction, could be considerable, since much of the bioprocessing industry will be developed in rural areas near biomass feedstocks.

A sub-report on "Workforce Development in Renewable Energy Technology" prepared by BioDimensions, Inc. (www.agbioworks.org) lists a projected staffing pattern for a biorefinery, including management (including procurement, logistics, and quality assurance), quality control and maintenance technicians, shift operators, material handlers, clerical workers, sales and marketing. Educational requirements span from a high school diploma to advanced degrees in finance and engineering. Most occupations would pay more than the state median wage. Staffing the biorefineries would require a considerable training investment in the current and emerging workforce of the Mississippi Delta area, but the investment could be a key to addressing generational poverty in the area.

Training investment must take place through the collaboration of the states, community colleges, four-year institutions and technology centers working together to develop the best quality training in renewable energy technology. A model is the Arkansas Delta Training and Education Consortium (ADTEC) which has assembled the best practices in teaching and learning in renewable energy technology. Training dollars for dislocated workers, youth, and others eligible for workforce services could be used to invest in Tennesee's workforce for renewable energy technologies.

Other regional development strategies in such areas as health care, information technology and biotechnology constantly inform and move the process of economic and workforce development forward.

Summary

Tennessee has achieved remarkable success in landing a wide array of emerging technology projects relating to energy independence. These include the Hemlock Semiconductor in Clarksville; Wacker Chemie AG in Cleveland; the planned Volunteer State Solar Initiative for Jackson and Oak Ridge; the Volkwagen high fuel diesel car plant in Chattanooga; the Nissan lithium ion facility and electric car production; and eTec, to provide electric charging stations. In addition, the new Clean Energy law will move the state into a leadership position on energy management. The Memphis Delta regional biobased strategy shows significant promise for replacement of fossil fuel-based products and potentially could create 25,000 jobs in the five state region in the next 10 years, a good number of those in rural areas. Federal stimulus and private funds will both contribute significantly.

With billions of dollars in investment planned over the next 5-10 years, the next challenge for Tennessee will be informing current workers and preparing the workforce needed. Tennessee can tie these very promising investments into employment and re-employment strategies to raise the state's average income and revenues and reduce its high rate of poverty.

The emerging opportunities related to energy will require a workforce that is up-to-date and competent in math and science. A continual focus on improving test scores in these areas and increasing high school graduation rates will be required. Continuing efforts will be needed to build strong linkages among high schools, community colleges, and four year institutions through curriculum alignment, articulation, dual enrollment, dual credit, and distance learning opportunities to build and strengthen students' interests and skills in new technologies.

With current high unemployment rates, incumbent and dislocated worker training funds can be used to upgrade workers' skills and abilities for new challenges. Better labor exchange tools will also be needed in Tennessee to allow workers to be appraised more quickly of emerging job openings, and to allow qualified workers to compete more equitably for those jobs. A grant recently submitted to the U.S. Department of Labor would provide funds for those tools, as well as fund more research into exactly the kinds of green jobs that will be created by clean energy investments.

A broad-based regional development strategy like the one in the Memphis Delta area can build the political will and capital to move economic development and training forward and has the potential to energize economic investment.

VII. Cluster Analyses of Employment

Career Cluster Analyses of Long-Term Supply and Demand to 2016

Tennessee does long-term projections every two years to inform the education and training system, as well as individuals, of the need for additional training, as well as areas where a larger number of graduates of training programs may not be needed. The projections are ten- year projections and assume that conditions of average growth will prevail over the period. The peaks and troughs of the business cycle, such as Tennessee is currently experiencing, are not reflected in the long term projections- they are more focused on longer term trends. When the 10 year projections are completed, the average number of openings for each occupation due to growth and separations for a year are compared to the number of people completing training programs in a recent year to create the supply and demand analysis.

Occupations are grouped into clusters with their related training programs. The number of openings for occupations in each cluster is compared with the number of people trained to fill the job openings.

The definitions for supply and demand are important:

- Supply for an occupation is the number of job seekers qualified for the position.
- Demand for an occupation is the number of job openings expected.

Educational, Industrial, and Placement Considerations of the Supply/Demand Ratio

The clusters with low supply-demand ratios, with little supply but much demand, are ranked as "excellent." Supply/demand ratios are critical considerations for healthy industrial and educational systems. High ratios and low ratios of supply and demand are meaningful categories for education and training systems.

A high ratio can mean that significant numbers of workers will be unable to acquire a job in that occupation. This situation can contribute to unemployment. On the other hand, especially for occupations requiring advanced training, a high supply can contribute to a workforce with enhanced qualifications, or to an "over-qualified" status. High supply ratios can indicate misapplication of educational resources.

A low ratio usually means there is a training or education shortfall. This can lead to slow industrial growth, and an advantaged competition. An occupation staffed with "under-qualified" workers can lead to quality problems. A training or education system that is not "leading edge" may fail to train for current and future jobs.

A workforce diversified by education and ability is a good answer to workforce supply problems. Educational achievement can be effective in reducing the unemployment rate.

A diversified workforce can more easily position itself from occupations of high supply/demand ratios to those with low supply/demand. Educational programs featuring learning applicable to a broad range of occupations are an answer to some of these considerations. The evaluation of mathematics as a desired knowledge (Tennessee State Government, 2008, Investing for Growth in Tennessee's Workforce, 2006-2016, Table 13, page 41), and a high supply of mathematicians (Table 33, page 78), indicates that there should be sufficient teaching resources available to integrate a minimal level of mathematics uniformly across the educational system.

Placement of workers from over-supplied occupations into other occupations requiring similar training can alleviate supply/demand imbalances. Departments of Human Resources can become more adept at providing more general definitions of occupational work requirements to facilitate the hiring of more diversified, yet qualified, workers. The use of skills, knowledge, and work values in the 2008 report (Tennessee State Government, 2008, Investing for Growth) presents some clues as to how this can be done using O*NET-like categories (skills in Table 12, page 40; knowledge in Table 12, page 41; average work styles in Table 14, page 42). Hiring is not a simple process, with many considerations necessary for the perfect "fit."

Supply/Demand Ratio Ordering

Rankings are ordered alphabetically from "a" to "p", as a measure of the supply/demand ratio. Clusters ranked "a" have occupations with a healthy demand; as rankings fall down the alphabet ladder, they increasingly have more supply, or more trained workers for their occupations. Unranked occupations fall into the "u" category. Rankings are:

- Excellent supply /demand ratio ("a"). The growth rates of these occupations are above average for the state. Job openings are greater than the number qualified to do the job. .
- Very good supply/demand ratio ("b"). Their growth rates are positive but not above average. There are more job openings than there are training completers in a recent year.
- Favorable supply/demand ratio ("c"). The growth rates of these occupations are positive. There are more training completers than job openings in a recent year, but not more than 1.5 times as many training completers as job openings.
- Competitve supply/demand ratio ("d"). There are more training completers in a recent year than job openings. There are from 1.5 to 3 times as many training completers as job openings.
- Very competitive supply/demand ratio ("e"). The growth rate is positive for these occupations. There are 3 or more times as many training completers as job openings.
- Favorable adjusted supply/demand ratios ("p"). These occupations have a low number of job openings (demand) for the supply. Available placement rates, however, show that the number of training completers working in jobs related to their training has been high.

- Unclassified occupations with supply/demand ratios not estimated ("u"). No training program is required, training programs are not available, or there are less than 10 openings.

Supply/Demand Tables

Excellent Supply/Demand. Occupational clusters with excellent job opportunities represent numerous categories including medical, human services, construction, electrical applications, and various technologies (Table 29, page 74). Training codes are given for the clusters. The codes represent the modal education or training category for the occupations comprising the cluster. The codes are:

- 1: 1 Prof
- 2: Ph.D.
- 3: MA
- 4: BA+Work
- 5:BA
- 6: AA
- 7: Post Secondary
- 8: Related Work Experience
- 9: Long-term Training
- 10: Moderate Term
- 11: Short-term.

Very Good Supply/Demand. These clusters include administration, accommodation services, electronic applications, various crafts, and technologies (Table 30, page 14).

Favorable Supply/Demand. These clusters have favorable supply and demand (Table 31, page 76). Some favorable clusters include communications technology, diesel engine repair, dramatic arts, dental laboratory technology and radiation therapy.

Competitive Supply/Demand. General business and management, medical occupations, social sciences, religion, automotive service, and a number of other applications are included here (Table 32, page 77).

Very Competitive Supply/Demand. The most competitive include communications and broadcasting, optometry, dentistry, psychology, economics, postsecondary English and teacher education (Table 33, page 78).

Table 29. a-Cluster Codes of Occupations with Excellent Supply/Demand Ratio.

Cluster Title	Supply	Demand	SD Ratio	Shortage/ Surplus(-)	Train- ing Mode	Cluster Code
Accounting & Financial Management	1330	1560	0.9	230	5	2115
Adult And Continuing Education	50	140	0.4	90	8	5185
Agricultural Production	90	870	0.1	780	11	7015
Animal Technology	70	220	0.3	150	11	7580
Appliance & Equipment Repair	20	150	0.2	130	7	6413
Biomedical Equipment Technology	0	50	0.1	50	6	6731
Brick, Block And Stonemasonry	60	190	0.3	130	9	6705
Care Of Children And Youth	290	2130	0.1	1830	11	5575
Computer Systems	1250	1500	0.8	250	5	7325
Construction Technology	40	400	0.1	360	5	6455
Diesel Engine Repair	240	250	1.0	10	7	6752
Electrical/Computer Engineering	280	440	0.6	160	5	7466
Electrician Occupations	330	800	0.4	460	9	6725
Elementary Teaching	790	1400	0.6	600	5	5168
Fire Control & Safety Technology	60	360	0.2	300	9	5635
Food Preparation & Services	130	6120	0.0	5990	11	4600
Heavy Equipment Repair	20	220	0.1	200	9	6754
Horticulture And Landscaping	210	730	0.3	520	11	7020
Human Services	330	470	0.7	140	3	5628
Laboratory Technicians	120	160	0.8	30	6	7520
Law Enforcement Education	20	30	0.7	10	9	5182
Legal Assisting	200	220	0.9	20	6	5140
Misc. Construction Trades	80	1630	0.1	1540	10	6715
Nursing Assistant	420	1560	0.3	1140	7	3541
Optical Technology	0	40	0.0	40	10	6547
Optometric Technology	10	60	0.2	40	9	3545
Orthotics/Prosthetics	0	20	0.0	20	5	6573
Personnel Occupations	620	790	0.8	170	4	2130
Pharmacists	240	340	0.7	100	1	3584
Pharmacy Assisting	350	730	0.5	380	10	3570
Plumbing And Pipefitting	20	540	0.0	520	9	6720
Preschool/Kindergart. Teaching	140	590	0.2	450	7	5166
Radiographic Medical Technology	120	190	0.6	70	6	3555
Religious Activities & Education	50	200	0.2	160	5	5176
Sales & Merchandising	90	9190	0.0	9100	11	2240
Secondary And Vocational Education	1350	1470	0.9	120	5	5169
Security Services	110	1850	0.1	1740	11	5631
Sheet Metal	0	190	0.0	190	9	6840
Small Engine Repair	90	90	1.0	0	9	6762
Social Work	240	620	0.4	380	5	5160
Special Education Teaching	300	400	0.7	100	5	5170
Truck, Bus And Heavy Equipment	1130	3430	0.3	2290	10	6995
Ultrasonic Technology	40	50	0.9	10	6	3557
Urban & Regional Planning	10	20	0.5	10	3	5148
Veterinary Medicine	60	70	1.0	0	1	7050
Welding Technology	300	480	0.6	180	7	6850

Table 30. b-Cluster Codes of Occupations with Very Good Supply/Demand Ratio.

Cluster Title	Supply	Demand	Supp/ Dem Ratio	Shortage / Surplus (-)	Modal Train-ing	Cluster Code
Administrative Support: Accounting	420	1610	0.3	1190	10	2116
Administrative Support: General	1970	9580	0.2	7610	10	2125
Agriculture & Food Science Technicians	0	50	0.0	50	5	7054
Agriculture Power & Machinery	100	130	0.8	20	10	6010
Airplane Pilot & Navigation	0	80	0.0	80	5	6871
Building Maintenance	0	470	0.0	470	10	6627
Carpentry	120	460	0.3	340	9	6710
Communications Electronics	0	120	0.0	110	7	6412
Electrical & Power Transmission Installation	30	190	0.2	160	9	6730
Electromechanical Instrument Prod./Repair	0	150	0.0	140	11	6415
Hotel/Restaurant Management	130	380	0.3	260	8	4625
Industrial Engineering	60	150	0.4	90	5	7470
Laboratory Technology	50	110	0.5	50	5	7519
Library Science	90	130	0.7	40	3	5172
Machine Tool Technology	320	960	0.3	640	10	6450
Miscellaneous Mining And Construction Workers	0	40	0.0	40	10	6895
Public Administration	300	900	0.3	600	4	2102
Science Technologies	0	100	0.0	100	6	7458
Surveying & Civil Technology	30	110	0.2	80	5	7806
Tailoring/Dressmaking	0	30	0.0	30	9	6606
Travel Services	0	190	0.0	190	11	4869

Table 31. c&p-Cluster Codes of Occupations with Favorable Supply/Demand Ratio.

Cluster Title	Supply	Demand	Supp/ Dem Ratio	Shortage/ Surplus(-)	Train-ing	Cluster Code
Dental Hygiene	170	140	1.2	-30	6	3507
Dental Laboratory Technology	30	30	1.2	-10	9	6521
Dramatic Arts	170	140	1.2	-30	3	1153
General Engineering	200	140	1.5	-70	5	7478
Heating And Air Conditioning	70	50	1.4	-20	9	6420
Industrial Maintenance Technology	420	330	1.3	-90	9	6735
Law	400	380	1	-20	1	5150
Law Enforcement	780	770	1	-10	9	5630
Marketing/Advertisement/Public Relations	830	620	1.3	-210	4	2235
Nursing(R.N.)	3540	2370	1.5	-1170	6	3560
Occupational Therapy Assisting	50	40	1.4	-10	6	3552
Physical Therapy Assisting	120	110	1.2	-20	6	3553
Physician Assisting	60	40	1.4	-20	3	3565
Physicians & Surgeons	530	410	1.3	-120	1	3582
Practical Nursing	80	40	2.3	-40	7	3542
Respiratory Therapy	180	130	1.4	-50	6	3551

Table 32. d-Cluster Codes of Occupations with Competitive Supply/Demand Ratio.

Cluster Title	Supply	Demand	Supp/Dem Ratio	Shortage/ Surplus(-)	Train-ing	Cluster Code
Audiology And Speech Pathology	170	70	2.4	-100	3	3588
Automotive Body Repair	500	260	1.9	-240	9	6745
Automotive Service Technology	1220	550	2.2	-670	7	6751
Biological And Life Sciences	190	80	2.4	-110	2	7304
Civil Engineering	230	90	2.5	-140	5	7464
Conservation & Environ. Science	150	90	1.7	-60	3	7025
Dental Assisting	420	210	2.0	-210	10	3506
Dieticians And Nutritionists	90	40	2.2	-50	5	3586
Educational Counseling	240	150	1.6	-90	3	5164
Emergency Medical Technology	380	220	1.7	-160	7	3515
Engineering Technology	370	210	1.8	-170	5	7457
English Education Postsecondary	120	40	2.9	-80	3	5178
Foreign Language Educ Postsecondary	40	20	2.6	-20	3	5180
General Business & Management	5350	2980	1.8	-2370	4	2100
Medical Records Technology	280	170	1.7	-110	6	2572
Occupational Therapy	120	60	2.1	-60	3	3592
Physical Therapy	200	120	1.6	-80	3	3594
Quantitative Business Analysis	30	20	1.7	-10	3	7312
Recreational Leadership	810	400	2.0	-410	11	5216
Religion	750	310	2.4	-440	3	5174
Social Sciences	110	70	1.6	-40	2	5154
Surgical Technology	400	180	2.3	-230	7	3512
Water And Wastewater Technology	210	110	2.0	-100	9	6425

Table 33. e-Cluster Codes of Occupations with Very Competitive Supply/Demand Ratio.

Cluster Title	Supply	Demand	Supp/Dem Ratio	Shortage/ Surplus(-)	Train-ing	Cluster Code
Aircraft Mechanics	240	50	4.9	-190	7	6765
Arts And Crafts	390	80	4.9	-310	4	1815
Barbering And Cosmetology	2250	200	11.3	-2050	7	5345
Communications Technology	310	100	3.2	-210	9	1252
Communications/Journalism/Broadcast	1170	210	5.5	-960	5	1250
Computer Systems Support	260	20	13.2	-240	7	7323
Dentistry	200	20	10.2	-180	1	3598
Economics	360	100	3.8	-260	3	5156
Education Administration	2280	360	6.3	-1920	4	5101
Forest Maintenance/Conservation	80	20	4.0	-60	10	7024
Mathematics, Actuarial Science	330	70	4.7	-260	3	7302
Medical Assisting	1790	540	3.3	-1250	10	3571
Optometry	110	20	7.6	-100	1	3596
Psychology	350	100	3.5	-250	2	5152
Teacher Education Postsecondary	530	60	9.7	-480	2	5184

Occupations with Shortages

As Baby Boomers reach retirement age between 2011 and 2029, occupational shortages could place a large burden on the workforce and hamper economic growth. The labor shortage could affect some industries and higher-skilled occupations. A plurality of jobs requires short or moderate term training, and this is not a formidable requirement on training systems. Strong growth is expected for jobs with credentials of higher professional degrees (First Professional, PhD, MA, and AA).

Even if it should be true that Tennessee education is supplying sufficient graduates to fill the needs for Tennessee, these graduates may not stay in the state, but be attracted to jobs with greater pay elsewhere. Migration is sure to show change during the recent downturn, with house sales and affordability of migration having become a more serious issue. Even if there are enough doctoral degrees to fill the state's needs, the number of those with "First Professional" degrees such as medical doctors, pharmacists, and lawyers could fall short. See Yanagiura (2008) for much more detail on the supply of graduate education completers in Tennessee.

Tennessee Favorability. Some 37.0 percent of all workers in the nation were 18 to 64 years of age in 2006.[1] This figure is lower in Tennessee, with 36.6 percent of the employed aged 18 to 64 years. Tennessee's labor force ratios are likely to vary little relative to the nation through 2030.

The labor shortage will affect some industries and higher-skilled occupations. Businesses and their consortiums are beginning to implement plans to retain younger workers as well as older workers. Offering flexible hours to older workers and developing mentoring programs that ensure cultivation of skills, experience and institutional knowledge can slow down or even reverse job turnover. As early as 1983, Congress increased the age at which certain retirees receive Social Security benefits, intending to inspire workers to stay in the labor force longer. Efforts in both the public and private sectors can mitigate the negative effects of the Baby Boomers leaving the workforce too early.

The Challenge. Should labor shortages develop around the U.S., then businesses may have an incentive to locate in Tennessee where the labor supply is more favorable. Tennessee workers, however, can be enticed to leave the state and locate in other states should wages, training, and job opportunities not be available here.

[1] http://quickfacts.census.gov/qfd/states/47000.html

Table 34 (page 81) identifies occupations with high growth/replacement ratios in Tennessee through the year 2016. These include occupations in health services, other services, agriculture, computer systems, management, education, professions, and construction. The high growth, if not offset by replacement, can result in a shortfall of qualified candidates for the positions. Filling many of these shortages requires continued attention to improving high school and college graduation rates, improving the transition from high school to postsecondary education, and focusing on shortage areas to encourage programs of talent development and retention.

Nursing and Other Health Care Shortages. One area of significant concern has been the shortage of registered nurses (Table 34, page 81). An expected national shortfall of 340,000 nurses by 2020 is expected (Rivers, 2007, Vanderbilt Reporter). The shortfall is lowered from a previous shortfall of 760,000, according to a recent study, with a large number of individuals in their late 20s and early 30s entering the profession. The need for trained nursing personnel in Tennessee will likely continue with the shortage of nursing instructors and space for operating nurse education programs (Griffith, 2007). Medical assistants, pharmacy assistants, pharmacy technicians, and dental assistants are among the high growth and low replacement occupations (Table 34, page 81).

Clusters of occupations and their related training programs, are grouped by their long-term employment outlook (Table 29, page 74, through Table 33, page 78). Those with supply/demand ratios of excellent, very good, and favorable (Table 29, Table 30, and Table 31) have the best long-term outlook for job seekers, students, and employees most likely to change careers through 2016, based on current training levels. Registered nursing receives a favorable outlook and is in demand, although Tennessee has more registered nurse completers than long-term demand (1.4 times as many).

Teacher Shortages. Teacher shortages are concentrated by subject, geography, and the special needs of students. Subject areas lacking teachers include science, math, special education (especially visual and hearing disabilities), and foreign languages. Teachers in social studies are needed in urban areas. Special education teachers in preschool, kindergarten, and elementary school are in demand (Table 34, page 81). Shortages are best corrected by increasing supply in these particular subject areas (The Southern Regional Education Board, SREB). Reduction of teacher turnover is important to alleviate shortages (Jackson, 2006, SREB). Teacher turnover can perhaps be reduced by teacher programs and pay. Unlike most states in SREB that require teachers to participate in state supported mentor programs, Tennessee has a voluntary program for participation. The state raised pay for beginning teachers in 2007.

Transportation Shortages. Passengers of public transportation have increased with the rise in gas prices. Passenger trips in the Metropolitan Transit Authority in Nashville increased 16 percent from the previous year, and they faced driver shortages, specifically of operators with effective people skills (Harless, 2007).

Table 34. Occupations with High Growth/Replacement Ratios, 125 or more Growth Openings, Long-term Training (TR) or More, with Cluster Grade (CC), Ranked by Ratio

SOC	Title	2006 Employ-ment	Grwth. Rate	Annual Growth Open-ings	Annu-al Rep-lace-ment Open-ings	Ra-tio	CC	Median Salary	TR
49-9042	Maintenance and Repair Workers, General	33,170	1.0%	365	80	4.6	b	$31,100	10
11-9011	Farm, Ranch, and Other Agricultural Managers	5,370	2.8%	170	40	4.3	b	$56,200	4
21-1093	Social and Human Service Assistants	3,190	2.9%	105	35	3.0	a	$25,300	10
31-9092	Medical Assistants	9,220	3.2%	335	115	2.9	c	$25,700	10
23-2011	Paralegals and Legal Assistants	3,730	3.3%	145	50	2.9	c	$36,900	6
15-1081	Network Systems and Data Communications Analysts	2,810	4.4%	155	55	2.8	a	$62,600	5
15-1031	Computer Software Engineers, Applications	3,310	3.4%	130	50	2.6	a	$69,900	5
29-1051	Pharmacists	5,640	3.5%	230	100	2.3	a	$107,800	1
35-1012	First-Line Supervisors/Managers of Food Preparation and Servers	18,270	1.5%	285	135	2.1	a	$24,500	8
29-2052	Pharmacy Technicians	7,970	4.6%	455	245	1.9	a	$26,100	10
29-2041	Emergency Medical Technicians and Paramedics	6,290	1.8%	125	70	1.8	p	$28,400	7
21-1023	Mental Health and Substance Abuse Social Workers	2,830	3.2%	105	60	1.8	a	$28,900	3
29-1111	Registered Nurses	51,960	2.3%	1345	860	1.6	c	$54,000	6
25-2011	Preschool Teachers, Except Special Education	10,170	2.3%	260	170	1.5	a	$17,700	7
31-9091	Dental Assistants	5,020	2.2%	125	85	1.5	a	$30,100	10
29-2034	Radiologic Technologists and Technicians	5,560	1.7%	105	75	1.4	c	$46,700	6
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	6,490	2.2%	160	115	1.4	c	$30,200	9
25-2041	Special Education Teachers, Preschool, Kindergarten, and Elementary	4,330	2.6%	130	95	1.4	a	$39,200	5
49-9041	Industrial Machinery Mechanics	5,880	2.1%	135	100	1.4	c	$37,300	9
23-1011	Lawyers	7,980	2.3%	200	150	1.3	c	$93,400	1
21-2011	Clergy	9,620	1.6%	170	130	1.3	d	$44,300	3
47-2152	Plumbers, Pipefitters, and Steamfitters	9,090	2.4%	245	190	1.3	a	$36,400	9
15-1071	Network and Computer Systems Administrators	4,560	2.5%	130	105	1.2	a	$62,400	5
11-9021	Construction Managers	9,610	1.7%	180	150	1.2	a	$55,400	5
13-2011	Accountants and Auditors	17,200	1.9%	355	305	1.2	a	$49,700	5

Construction Shortages. When regional growth and utility company expansion and maintenance requirements accentuated labor needs and industrial craft labor in the Southeast worsened (Haskew, 2007), the Southeastern Manpower Tripartite Alliance was formed in 2005. The industrial construction sector, which was close to full employment in October 2006, was expected to increase 25 percent in the next two years and remain high through 2010. Shortages of painters, ironworkers, pipefitters (Table 34, page 81), and insulators were forecast. New power generation capacity was expected to create shortages of electricians, insulators, and boilermakers. Other workers that are in demand include maintenance and repair workers; heating, air conditioning, and refrigeration mechanics, and installers; and industrial machinery mechanics (Table 34, page 81).

Conclusion

The writers would be remiss without suggesting some general applications of the information previously presented. Analysis of employment yields some important conclusions. Unemployment has increased the last few months in Tennessee. Projections show that for the next two years, it is expected that employment will grow but at a slower rate. Long-term employment is likely to return to growth rates only slightly less than the growth rates of the past decade.

- Employment from 2006 to 2016 is expected to resume the previous growth patterns.

Goods producing industries will show below average growth for the 2006 to 2016, and manufacturing may actually decrease. Nevertheless, niche manufacturing is likely to grow. Emerging industries, including the renewable industry corridor, show even more promise of bringing employment benefits to Tennesseans.

- Employment from 2006 to 2016 can be strengthened by emphasis on emerging and revitalized industries, including industries improving energy-efficiency.

Contemporary challenges, including both energy-related and financial, provide an opportunity for responsive growth. Energy shortages could propel research and production in promising new industries.

Appendix A

Table 35, Appendix A. Industry Growth in Tennessee 2006-2016

NAICS	Title	2006 Estimated Employ-ment	2016 Projected Employ-ment	Annual Growth Rate	10 Year Growth
110000	Agriculture, Forestry, Fishing , Hunting	32850	36250	1.0%	3400
111000	Crop Production	21370	23590	1.0%	2220
112000	Animal Production	5490	7430	3.1%	1940
115000	Support Activities for Agriculture and Forestry	5180	4630	-1.1%	-550
210000	Mining	2610	2720	0.4%	100
211000	Oil and Gas Extraction	40	40	-0.3%	0
212000	Mining (except Oil and Gas)	2160	2300	0.7%	150
213000	Support Activities for Mining	420	380	-1.1%	-40
220000	Utilities	3530	3260	-0.8%	-270
230000	Construction	130270	157660	1.9%	27390
236000	Construction of Buildings	32390	33200	0.2%	820
237000	Heavy and Civil Engineering Construction	16930	18210	0.7%	1280
238000	Specialty Trade Contractors	80950	106250	2.8%	25290
310000	Manufacturing	399400	375810	-0.6%	-23600
311000	Food Manufacturing	33980	31890	-0.6%	-2090
312000	Beverage and Tobacco Product Manufacturing	5190	5570	0.7%	370
313000	Textile Mills	5080	3120	-4.8%	-1970
314000	Textile Product Mills	3590	3050	-1.6%	-540
315000	Apparel Manufacturing	7430	3690	-6.8%	-3750
316000	Leather and Allied Product Manufacturing	1290	600	-7.3%	-690
321000	Wood Product Manufacturing	17920	17840	0.0%	-80
322000	Paper Manufacturing	18330	17840	-0.3%	-480
323000	Printing and Related Support Activities	17740	12350	-3.6%	-5400
324000	Petroleum and Coal Products Manufacturing	1050	830	-2.3%	-220
325000	Chemical Manufacturing	26300	22420	-1.6%	-3880
326000	Plastics and Rubber Products Manufacturing	27630	26990	-0.2%	-630
327000	Nonmetallic Mineral Product Manufacturing	16120	17140	0.6%	1030
331000	Primary Metal Manufacturing	11830	10340	-1.3%	-1480
332000	Fabricated Metal Product Manufacturing	43470	47370	0.9%	3900
333000	Machinery Manufacturing	33230	31740	-0.5%	-1490
334000	Computer and Electronic Product Manufacturing	9250	4060	-7.9%	-5200
335000	Electrical Equipment, Appliance, and Component Manufacturing	23180	27530	1.7%	4360
336000	Transportation Equipment Manufacturing	63730	66130	0.4%	2400
337000	Furniture/Related Product Manufacturing	17740	12060	-3.8%	-5690
339000	Miscellaneous Manufacturing	15330	13260	-1.4%	-2080

Table 35, Continued

NAICS	Title	2006 Estimated Employ-ment	2016 Projected Employ-ment	Annual Growth Rate	10 Year Growth
420000	Wholesale Trade	132030	147420	1.1%	15390
423000	Merchant Wholesalers, Durable Goods	68710	84380	2.1%	15670
424000	Merchant Wholesalers, Nondurable Goods	46870	45450	-0.3%	-1420
425000	Wholesale Electronic Markets and Agents and Brokers	16460	17600	0.7%	1140
440000	Retail Trade	327870	361950	1.0%	34080
441000	Motor Vehicle and Parts Dealers	43710	47080	0.7%	3370
442000	Furniture and Home Furnishings Stores	10380	10600	0.2%	210
443000	Electronics and Appliance Stores	9120	9750	0.7%	630
444000	Building Material and Garden Equipment and Supplies Dealers	28130	33890	1.9%	5760
445000	Food and Beverage Stores	46500	40810	-1.3%	-5690
446000	Health and Personal Care Stores	22670	32760	3.8%	10090
447000	Gasoline Stations	24100	21080	-1.3%	-3020
448000	Clothing and Clothing Accessories Stores	30180	33660	1.1%	3480
451000	Sporting Goods, Hobby, Book, and Music Stores	12580	16210	2.6%	3630
452000	General Merchandise Stores	71480	84250	1.7%	12770
453000	Miscellaneous Store Retailers	17780	18620	0.5%	840
454000	Nonstore Retailers	11240	13240	1.6%	2000
480000	Transportation and Warehousing	146380	166420	1.3%	20040
481000	Air Transportation	6450	6290	-0.2%	-160
483000	Water Transportation	2350	3410	3.8%	1060
484000	Truck Transportation	64180	71760	1.1%	7590
485000	Transit and Ground Passenger Transport	5720	7320	2.5%	1600
487000	Scenic and Sightseeing Transportation	390	490	2.4%	110
488000	Support Activities for Transportation	10630	13290	2.3%	2660
492000	Couriers and Messengers	38790	42350	0.9%	3560
493000	Warehousing and Storage	13520	17870	2.8%	4350
510000	Information	49460	50310	0.2%	850
511000	Publishing Industries	13900	13970	0.1%	70
512000	Motion Picture and Sound Recording Industries	7820	7230	-0.8%	-590
515000	Broadcasting (except Internet)	7490	7300	-0.2%	-180
516000	Internet Publishing and Broadcasting	150	210	3.7%	60
517000	Telecommunications	16290	17040	0.4%	740
518000	Internet Service Providers, Web Search Portals, and Data Pro	3520	4170	1.7%	650
519000	Other Information Services	300	390	2.8%	100

Table 35, Continued

NAICS	Title	2006 Estimated Employ-ment	2016 Projected Employ-ment	Annual Growth Rate	10 Year Growth
520000	Finance and Insurance	106790	120070	1.2%	13280
521000	Monetary Authorities - Central Bank	770	860	1.2%	100
522000	Credit Intermediation and Related Activities	57930	62880	0.8%	4950
523000	Securities, Commodity Contracts, and Other Financial Investm	8460	12320	3.8%	3870
524000	Insurance Carriers and Related Activities	38870	42610	0.9%	3740
525000	Funds, Trusts, and Other Financial Vehicles	760	1400	6.3%	640
530000	Real Estate and Rental and Leasing	34640	38010	0.9%	3380
531000	Real Estate	21770	23910	0.9%	2150
532000	Rental and Leasing Services	11920	12950	0.8%	1030
533000	Lessors of Nonfinancial Intangible Assets (except Copyrighte	950	1150	1.9%	200
541000	Professional, Scientific, and Technical Services	105420	126070	1.8%	20650
550000	Management of Companies and Enterprises	23440	32150	3.2%	8710
560000	Administrative and Support and Waste Management and Remediat	188380	228070	1.9%	39680
561000	Administrative and Support Services	180800	217080	1.8%	36290
562000	Waste Management and Remediation Service	7590	10990	3.8%	3400
610000	Educational Services	231430	266470	1.4%	35040
620000	Health Care and Social Assistance	316670	396380	2.3%	79710
621000	Ambulatory Health Care Services	108880	135740	2.2%	26860
622000	Hospitals	114070	133150	1.6%	19080
623000	Nursing and Residential Care Facilities	52380	67230	2.5%	14860
624000	Social Assistance	41350	60270	3.8%	18920
710000	Arts, Entertainment, and Recreation	30140	33820	1.2%	3680
711000	Performing Arts, Spectator Sports, and Related Industries	8940	9430	0.5%	490
712000	Museums, Historical Sites, and Similar Institution	3030	3940	2.7%	910
713000	Amusement, Gambling, and Recreation Industries	18170	20460	1.2%	2290
720000	Accommodation and Food Services	238340	276870	1.5%	38530
721000	Accommodation	35010	39190	1.1%	4190
722000	Food Services and Drinking Places	203340	237680	1.6%	34340

Table 35, Continued

NAICS	Title	2006 Estimated Employ-ment	2016 Projected Employ-ment	Annual Growth Rate	10 Year Growth
810000	Other Services (Except Government)	124980	135850	0.8%	10870
811000	Repair and Maintenance	22160	27000	2.0%	4840
812000	Personal and Laundry Services	24380	22710	-0.7%	-1670
813000	Religious, Grantmaking, Civic, Professional, and Similar Org	56640	66210	1.6%	9570
814000	Private Households	21800	19930	-0.9%	-1870
900000	Government	187250	213570	1.3%	26320
910000	Total Federal Government Employment	31330	35180	1.2%	3850
920000	State, Excluding Education and Hospitals	45270	47490	0.5%	2220
930000	Local, Excluding Education and Hospitals	110650	130900	1.7%	20250

Table 36, Appendix A. Industry by Educational Level, Tennessee, 2006-2016

Educational Level	Estimate 2006	Projection 2016	Growth 2006-2016	Annual Growth Rate
Self-Employed Workers, Primary Job	193290	207650	14360	0.7%
First professional degree	4490	5100	610	1.3%
Doctoral degree	930	1090	150	1.5%
Master's degree	1520	1600	80	0.5%
Bachelor's or higher degree, plus work experience	11510	11870	360	0.3%
Bachelor's degree	21570	23450	1880	0.8%
Associate degree	1770	1820	50	0.3%
Postsecondary vocational training	15000	16450	1450	0.9%
Work experience in a related occupation	45140	48580	3450	0.7%
Long-term on-the-job training	22800	24190	1390	0.6%
Moderate-term on-the-job training	32020	35310	3290	1.0%
Short-term on-the-job training	36540	38190	1650	0.4%
Unpaid Family Workers, Primary Job	2630	2210	-420	-1.7%
Bachelor's or higher degree, plus work experience	40	30	-10	-3.3%
Bachelor's degree	50	40	-10	-2.2%
Associate degree	40	30	-10	-1.8%
Postsecondary vocational training	50	50	0	0.2%
Work experience in a related occupation	240	190	-50	-2.4%
Long-term on-the-job training	140	100	-40	-3.5%
Moderate-term on-the-job training	730	600	-140	-2.1%
Short-term on-the-job training	1350	1190	-160	-1.3%
Natural Resources and Mining	35040	38500	3470	0.9%
First professional degree	10	10	0	2.7%
Doctoral degree	0	0	0	0.0%
Master's degree	30	30	0	-1.2%
Bachelor's or higher degree, plus work experience	6060	7620	1560	2.3%
Bachelor's degree	480	440	-40	-0.9%
Associate degree	160	160	0	-0.2%
Postsecondary vocational training	180	190	10	0.3%
Work experience in a related occupation	2610	2400	-200	-0.8%
Long-term on-the-job training	550	540	-10	-0.2%
Moderate-term on-the-job training	7530	7410	-120	-0.2%
Short-term on-the-job training	17420	19700	2280	1.2%
Construction	128480	155520	27040	1.9%
Bachelor's or higher degree, plus work experience	7370	8020	650	0.9%

Table 36, continued

Educational Level	Estimate 2006	Projection 2016	Growth 2006-2016	Annual Growth Rate
Bachelor's degree	6520	7960	1440	2.0%
Associate degree	130	160	30	2.0%
Postsecondary vocational training	4150	5430	1290	2.7%
Work experience in a related occupation	12260	14240	1980	1.5%
Long-term on-the-job training	37560	46960	9390	2.3%
Moderate-term on-the-job training	44720	53750	9030	1.9%
Short-term on-the-job training	15780	19010	3230	1.9%
Manufacturing	397730	374170	-23560	-0.6%
First professional degree	30	30	0	0.0%
Doctoral degree	180	100	-70	-5.1%
Master's degree	240	210	-30	-1.5%
Bachelor's or higher degree, plus work experience	17160	15370	-1800	-1.1%
Bachelor's degree	16300	15760	-540	-0.3%
Associate degree	4510	4170	-340	-0.8%
Postsecondary vocational training	13350	13850	500	0.4%
Work experience in a related occupation	33380	31820	-1560	-0.5%
Long-term on-the-job training	37720	36830	-890	-0.2%
Moderate-term on-the-job training	191870	183430	-8440	-0.4%
Short-term on-the-job training	83000	72600	-10400	-1.3%
Trade, Transportation, and Utilities	604210	672850	68650	1.1%
First professional degree	4580	6650	2070	3.8%
Doctoral degree	30	30	0	1.3%
Master's degree	150	170	20	1.1%
Bachelor's or higher degree, plus work experience	22110	23810	1710	0.7%
Bachelor's degree	19410	23230	3820	1.8%
Associate degree	3430	4150	710	1.9%
Postsecondary vocational training	19190	22010	2810	1.4%
Work experience in a related occupation	74700	84650	9950	1.3%
Long-term on-the-job training	19180	21840	2660	1.3%
Moderate-term on-the-job training	127440	147460	20020	1.5%
Short-term on-the-job training	313980	338860	24880	0.8%
Information	47000	47780	780	0.2%
First professional degree	20	20	0	0.0%
Doctoral degree	50	70	20	3.9%
Master's degree	160	190	30	1.7%
Bachelor's or higher degree, plus work experience	5040	5070	30	0.1%
Bachelor's degree	6700	6990	290	0.4%
Associate degree	2270	2200	-80	-0.3%
Postsecondary vocational training	4070	3460	-610	-1.6%
Work experience in a related occupation	3720	3710	-20	0.0%

Table 36, continued

Educational Level	Estimate 2006	Projection 2016	Growth 2006-2016	Annual Growth Rate
Long-term on-the-job training	2960	2740	-230	-0.8%
Moderate-term on-the-job training	11730	13210	1480	1.2%
Short-term on-the-job training	10270	10130	-150	-0.1%
Financial Activities	140800	157330	16530	1.1%
First professional degree	350	390	40	1.1%
Master's degree	320	350	30	0.9%
Bachelor's or higher degree, plus work experience	14740	15740	1000	0.7%
Bachelor's degree	27150	32260	5110	1.7%
Associate degree	1780	2040	260	1.4%
Postsecondary vocational training	1780	1950	180	1.0%
Work experience in a related occupation	13620	14460	840	0.6%
Long-term on-the-job training	4430	5200	770	1.6%
Moderate-term on-the-job training	38150	43550	5400	1.3%
Short-term on-the-job training	38490	41410	2920	0.7%
Professional and Business Services	313270	381460	68190	2.0%
First professional degree	5140	6750	1610	2.8%
Doctoral degree	420	450	30	0.7%
Master's degree	1730	2170	430	2.3%
Bachelor's or higher degree, plus work experience	21860	26860	5000	2.1%
Bachelor's degree	37540	48190	10650	2.5%
Associate degree	16630	20680	4040	2.2%
Postsecondary vocational training	7990	9080	1090	1.3%
Work experience in a related occupation	19890	24660	4770	2.2%
Long-term on-the-job training	6990	8030	1040	1.4%
Moderate-term on-the-job training	77880	95590	17710	2.1%
Short-term on-the-job training	117190	139020	21830	1.7%
Education and Health Services	539480	652490	113010	1.9%
First professional degree	11780	14130	2350	1.8%
Doctoral degree	15080	17670	2590	1.6%
Master's degree	29950	36640	6690	2.0%
Bachelor's or higher degree, plus work experience	26740	30480	3740	1.3%
Bachelor's degree	97570	118610	21040	2.0%
Associate degree	70760	88270	17510	2.2%
Postsecondary vocational training	64430	77340	12910	1.8%
Work experience in a related occupation	23400	26960	3560	1.4%
Long-term on-the-job training	4390	5020	630	1.4%
Moderate-term on-the-job training	70900	83630	12730	1.7%
Short-term on-the-job training	124480	153740	29260	2.1%
Leisure and Hospitality	267810	309840	42030	1.5%

Table 36, continued

Educational Level	Estimate 2006	Projection 2016	Growth 2006-2016	Annual Growth Rate
Doctoral degree	10	10	0	3.4%
Master's degree	80	110	30	2.7%
Bachelor's or higher degree, plus work experience	6830	7380	560	0.8%
Bachelor's degree	1130	1340	210	1.7%
Associate degree	40	50	10	1.4%
Postsecondary vocational training	1940	2300	360	1.7%
Work experience in a related occupation	25700	29270	3580	1.3%
Long-term on-the-job training	21690	24710	3020	1.3%
Moderate-term on-the-job training	10090	11550	1460	1.4%
Short-term on-the-job training	200290	233120	32820	1.5%
Other Services (Except Government)	121260	131440	10180	0.8%
First professional degree	30	30	0	0.6%
Doctoral degree	60	70	10	2.0%
Master's degree	10130	11970	1840	1.7%
Bachelor's or higher degree, plus work experience	6460	7030	570	0.8%
Bachelor's degree	9520	11140	1630	1.6%
Associate degree	1530	1510	-20	-0.1%
Postsecondary vocational training	14710	16550	1850	1.2%
Work experience in a related occupation	7440	8510	1070	1.4%
Long-term on-the-job training	7280	8940	1660	2.1%
Moderate-term on-the-job training	14020	14950	930	0.6%
Short-term on-the-job training	50080	50730	650	0.1%
Government	183820	209740	25920	1.3%
First professional degree	1520	1860	340	2.0%
Doctoral degree	280	300	20	0.6%
Master's degree	4580	5110	530	1.1%
Bachelor's or higher degree, plus work experience	10070	11130	1070	1.0%
Bachelor's degree	19360	22060	2710	1.3%
Associate degree	6750	7610	870	1.2%
Postsecondary vocational training	10840	12410	1580	1.4%
Work experience in a related occupation	18260	20950	2690	1.4%
Long-term on-the-job training	25660	30330	4660	1.7%
Moderate-term on-the-job training	42950	49320	6370	1.4%
Short-term on-the-job training	43550	48650	5090	1.1%
Total	2974820	3341000	366170	1.2%
First professional degree	27960	34970	7010	2.3%
Doctoral degree	17050	19800	2760	1.5%
Master's degree	48910	58550	9640	1.8%
Bachelor's or higher degree, plus work experience	155960	170390	14430	0.9%

Table 36, continued

Educational Level	Estimate 2006	Projection 2016	Growth 2006-2016	Annual Growth Rate
Bachelor's degree	263290	311460	48170	1.7%
Associate degree	109800	132840	23030	1.9%
Postsecondary vocational training	157660	181070	23410	1.4%
Work experience in a related occupation	280350	310410	30060	1.0%
Long-term on-the-job training	191370	215410	24050	1.2%
Moderate-term on-the-job training	670040	739760	69720	1.0%

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